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Atlanta, Ga., Oct. 23d, 1897

Dr. Dwight,

Dear Sir:

Yours of the 21st at hand and contents noted, and in reply will say, that only two numbers of the JOURNAL were ever published. The editors intentions were without doubt all right, but a great many beside yourself were deceived in the matter. The JOURNAL had good indorsements but nothing to back it but subscriptions. I do not know where a copy of the first number can be obtained and do not even remember if I have one myself. Am sorry I can give you no further information on the subject,

Very truly yours,

W. A. Stearns.

Natural Science Journal

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Publishers of "The Natural Science Journal."

New Bedford, Mass., Oct 21-1897.

Dr. Jonathan Dwight, Jr;

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Several months ago we suffered
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on by The West American Scientist,
San Diego, Calif. and we shall as
on as able get out some publications
ate to the subscribers who eventually
ill in no sense be losers.
I have procured and send herewith Vol. I
o. I.

Yours most respectfully
F. G. Hillman.

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32 YEARS OLD

Dr . Jonathan Dwight, Jr., December 17, 1897.

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Dear Sir:-

We have purchased the Natural Science Journal and it will be stopped as a separate publication. Its main features, however, will be continued regularly as a department of Popular Science News.

Subscriptions that are paid in advance will be made good proportionately by copies of popular Science News free of charge, and we have accordingly marked you paid on our books in full up to September 1899.

We also invite your attention to the enclosed premium list.

Yours very truly,

POPULAR SCIENCE NEWS.

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THE Natural Science Journal.

VOL. I. NEW BEDFORD, MASS., MARCH, 1897. No. 1.

Department of Geology.

Prof. G. K. GREENE, Editor.
23 WEST MARKET STREET, NEW ALBANY, IND.

I REGRET very much that pressing business will prevent me from giving the readers of the JOURNAL an article of some length. The subjects of which I will treat in future numbers will require some time and thought.

The Science of Geology and Paleontology, a matter of grave importance, especially to those who are making a study of the earth's crust and its fossil remains, requires patience and perseverance on the part of the student. Aside from the fossils, one must be familiar with the rocks of the different geological formations to judge of their merits for the different purposes that it is designed for.

I will take pleasure in giving to the subscribers of the NATURAL SCIENCE JOURNAL, who desire any information on Geology or Paleontology, that will write their questions plain and explicit and inclose a two-cent stamp for reply, an answer to them. No postal cards answered. Students and beginners need not feel the least delicacy in asking for information.

To any subscriber of the NATURAL SCIENCE JOURNAL who will by July 1st, 1897, get the greatest number of yearly subscribers to this magazine (cash must accompany each subscription) I will give twenty-five species of Fossil Corals, from the Falls of the Ohio, worth from fifty cents to one dollar each; and to the person getting the next greatest number of subscribers, fifteen species; and to the person getting the next greatest number, ten species. All specimens are nicely cleaned and properly identified; will be sent by express at the expense of the subscriber. The names of those receiving the awards will be published in the July number. G. K. GREENE.

CARBONIFEROUS ENTOMOLOGY IN NEW ENGLAND.

REV. EDGAR F. CLARK.

THE territory embraced in our examination is properly called the Rhode Island Coal Belt. Much of it is embraced in the State of Rhode Island, but the belt extends northward into Massachusetts, "cropping out" at Mansfield and elsewhere.

It is unnecessary to add that entomological specimens, belonging to the Carboniferous era, have possessed a deep interest for the geologist and the archeologist. Prof. Lacoe, of Pittston, Pa., is endeavoring to acquire all the specimens, and preserve them in a solitary collection.

The first specimen was first definitely recognized by the writer as early as

1885. It was found at Poppasquash Neck, in Bristol, R. I., and for several years its character was unknown. It was forwarded to the justly eminent entomologist, Prof. Samuel H. Scudder, for classification, and at the request of the discoverer it was named in honor of Prof. A. S. Packard, of Brown University, an eminent scholar in entomology. Its present name is Mylacris Pacardii. It remains in the possession of the writer. Most of the entomological specimens only embrace the wing, which alone in the case of insects, sufficiently withstands putrefaction. It belongs to the genus Mylacris, and is attached to the Orthopteroidea, and its subdivision, Palaeoblattariae. It is thus described by Prof. Scudder. "The wing is of a very large size for a Mylacis, being longer than even Mylacris antiqua, but slenderer than it, and is remarkably like M. heri, in the narrowness of the mediastinal area, which forms a rather narrow and nearly equal belt, wnich must extend nearly, or quite to the middle of the wing, and has five or six elongated scarcely diverging nervules, the outer of which spring from near the base of the main stem." He gives the probable length of the wing as 42mm, and the possible breadth as 18. 5mm. He remarks: "It is interesting because it is the first fossil insect found in the New England coal field."

It deserves to be noticed that the remark of a young man in New Bedford, first suggested its zoölogical character.

Several young men from Providence accompanied the writer on geological trips, and largely increased the number of entomological specimens. Among them were Messrs Herbert Scholfield, and Frederick P. Gorham, now a Professor in Brown University. The associate labors of Mr. Christopher Williams were especially useful, in the same direction. The following are among the species discovered in New England, and all belong to the R. I. coal belt: Paralogus aeschnoides; Raphidiopsis diversipenna; Anthracomartus Woodruffi; Etoblattina Gorhami; Etoblattina Scholfieldi; Etoblattina exilis; Etoblattina reliqua; Etoblattina illustris; Etoblattina Clarkii; Gerablattina fraterna; Gerablattina scapularis.

A large number of the above were taken from rocks removed in constructing a sewer in Pawtucket, to which our attention was first called by a visit of Prof. Shaler, of Harvard College. The importance of the "find" was deemed so great that a "Bulletin" was published by the government, No. 101, where the descriptions are given in full.

In closing, permit us to encourage all, especially the young, in the pursuit of fossil fauna and flora. Beside the pleasure receiveed, science is promoted, the mind is preoccupied with noble ambitions, and practical benefit oft results.

ANTIQUATED PLAYTHINGS.

It seems very odd to have unearthed the playthings as well as the tablets and weapons of antiquity; and yet among the objects found recently in the Assiobnecropolis in Egypt was a whole company of wooden soldiers, 15 inches in height. The soldiers carry lances, and give a good idea of the style of military equipment prevailing in the time of the Pharaohs.

Department of Anthropology.

J. S. SILVIA, Editor.
ACUSHNET, MASS.

The Editor is desirous of keeping in close alliance with all interested in this department. All correspondence concerning Anthropology, especially anything relating to new finds and explorations will be gladly received.

PERSISTENCE IN RACE TRAITS.

PERCY M. VAN EPPS.

HOW persistently linger many of the ancient traits in man and beast Every now and then some reminder of these ancient ways crop out in man; ideas and notions, unwittingly expressed, reminiscences of ancestral habits, customs, and superstitions. As the dog today involuntarily turns before lying down, to beat down the wild grass or reeds of the jungle in which his ancestors slept; so man does sometimes unconsciously betray by word or action certain inherited tendencies to actions or customs common to his predecessors.

Did you ever notice how carefully a flock of sheep will avoid a dense forest or a woods choked with undergrowth? A low-branched thicket of small area they will indeed resort to for shade and shelter; but only if its extent and surface configuration will allow them to see through and under to the open beyond. But they will instinctively shun a heavy forest, or even its borders, and it is only with considerable difficulty that they can be driven into such a growth. If this be necessary, and done, how curiously they will huddle together, and how timidly they will proceed. Centuries of domestication have not effaced this innate fear of the deep forest from the mind of the sheep. In the great forests lurked her ancient enemies, the wolf and other animals who were her constant foes.

Conversation held not long ago with an old lady living near me, born in the woods, her mother an Indian of the Stockbridge branch of the Mohicans, brought most forcibly to my notice a curious and interesting case of an ancestral trait cropping forth. This interesting character, though her infancy's days were passed in the forest, where she was born about 1819, was reared among the white peoples' families of the neighborhood. So it is very evident that any aural or visual impressions acquired in these few months of early childhood are not to be taken account of in classing the trait recorded as an inherited tendency, but that the mental process verbally expressed was purely intuitive or ancestral, an inherited idea of the ways and customs of her people.

This old lady, who can truly, and often does, boast of her American ancestors, has for a grandson an obstreperous lusty youth full of mischief and as fond of the weapons of Nimrod as was his dusky progenitors in the days when the streams ran even, and as yet the *woestina* was unbroken by the settler's clearing. The boy, whose father resides in New York city, came for two or three consecutive seasons to pass the summer months with his grandparents up country.

It was just before one of these annual visits that his grandmother approached me with the information that her grandson John was coming to pass the summer, "And you know," said she, "what a time he had last summer with his guns and pistols; how he frightened the people of the neighborhood with his reckless shooting, and how finally his fire-arms were taken from him and locked up." After expressing apprehension lest at his

coming visit he might obtain access to a brace of fine sporting guns belonging to his father, she said: "As for the two muskets belonging to his grandfather, I can bury them in the garden."

Here we have an ancestral trait, an expression of a custom common to the red-man. "Bury them," doubtless the first idea of concealment that came to her mind; in the ground, the usual hiding-place and safe treasury of the Indian for his most valued possessions, when it became desirable to conceal them. Witness the numerous *caches* unearthed in various localities; deposits of unfinished blanks, hidden stores of finished arrow-heads; here a few celts cunningly hidden beside a large boulder, there an immense quantity of chipped flint dises. In the instance recorded, possibly through innate unconscious association because the object to be concealed was a weapon, did the ancient idea come to mind the more readily and forcibly.

A broad field is open for the observation and study of these curious ancestral traits. Among mankind the large majority of such instances pass unrecorded, instances which if noted and preserved would all be of more or less value to Anthropology. And how very strange and inexplicable are all such phenomena! As Montaigne truly says, in speaking of inherited peculiarities of feature, figure, character, constitution, habits, and so forth, "We need not trouble ourselves to seek out miracles and strange difficulties; methinks there are such incomprehensible wonders amongst the things that we ordinarily see as surpass all difficulties of miracles." To which Richard Proctor adds: "And certainly few of the phenomena of nature are more wonderful than these, in the sense of being less obviously referable to any cause which seems competent to produce them. Many of those natural phenomena which are regarded as most striking are in this respect not to be compared with the known phenomena of heredity."

ART IN WARP AND WOOF.

Lee Roy J. Tappan.

"The seat of majesty Adraste brings
With art illustrations for the pomp of kings,
To spread the pall beneath the regal chair,
Of softest wool, is bright Acclipe's care."
— Odyssey, iv.

AMONG the arts of the ancients, none figured more prominently then, and none possess greater interest to-day, than that of weaving. From all available records in the form of exhumed pictorial representations and orignal manuscript, we are led to believe the weaving art was one of the most ancient institutions among the Hindos, Egyptians and Chinese, by whom it has been practiced for thousands of years. Indeed, according to Pliny, the very invention of weaving is attributable to Egypt. Certain other records show one Arkite Ghiden Ghelen, of three score years and ten, to have been the inventor of the first loom. However this may be, antique manufacturing methods, although essentially primitive, were productive of the most remarkable achievements, the fruit of the weaver's efforts invariably comparing most favorably and ofttimes excelling modern pieces in point of fineness and delicacy.

This perfection could only have been attained by those to whom the creation of the beautiful was a source of pleasure, rather than an arduous task performed solely for the securing of monetary gains;

it is safe to assume that the ancients labored at their looms more from an actual love of the art itself than for the intrinsic value of what it produced.

How then, could aught but the most beautiful examples of weaver's skill be included among those rightly prized "gems of the antique loom?" Wherever there is sympathy and enthusiasm, there too, may be found the perfect, well-rounded and finished product of the artisan's handiwork; this is a truth peculiarly poignant as applied to the industry now under consideration.

The originators of a loom could not have had that most valuable of appurtenances, the shuttle, for old and authentic writings allude to the weaver's habit of drawing the weft through the warp with the fingers; some utilized an instrument closely resembling a hooked knitting-needle, or a shepard's crook. This marked crudity of working materials materially abolished all thought of rapid construction and inexpressive results.

From the earliest ages the Oriental carpet has been Asia's chief luxury; the origin of their use as floor coverings has never been definitely ascertained, but historical records show them to have been in general use in the palaces of kings and the homes of wealth. Homer counts a carpet as one of the wonders with which Menelaus amazed Telemachus when that prince was received by him in the palace of Sparta. The Persian nobility made luxurious use of carpets, covering every visible portion of floor space, and frequently placing one, two and three choice specimens of warp and woof over the same article of furniture, even though it were elaborately carved or of solid gold.

This is luxuriousness indeed! We are further told that the tomb of Cyrus, at Pasargada, was hung with a magnificent Babylonian carpet, richly colored with a purple that most likely came from the renowned Tyrians, whose skill in dying has made their name famous. No weaver of ancient days equalled those of Babylon for fineness and richness of coloring. As for that, the principal productions of Babylonian looms were shawls and carpets, the latter being especially remarkable because of certain representations of strange and unnatural animals and varied forms with which they were ornamented.

From Biblical narration it is learned that the woven stuffs of Babylon were exported and not used for domestic purposes alone; it is probable for this reason more than any other, that the Western world became acquainted with the singular conceits used for designs in these wonderful weaves.

At the present time, the rarest and kingliest products of the loom come from Persia, and from this same source they have been coming for centuries. Notwithstanding the innumerable political convulsions from which it has suffered, Persia has maintained the position of the leading carpet weaving country, and boasts of a vast population whose sole occupation is that of weaving. To-day the Kashkais, Turkomans, Arabs, Shakseavans, Garous, Gains and Kurdistans, are weaving what are truly wonderful and beautiful specimens of the Persian carpet.

While the antique Persian pieces are quite costly, their longevity fully warrants the price demanded. They are peculiarly soft, rich and silky, and the

slightest details are worked out with an accuracy and precision that is marvelous.

Very often the ancient religion of Persia has been drawn upon for symbolic designs — the lion representing the sun, the dragon the night, the phœnix for the splendors of the day. These, together with more or less perfect representations of trees and flowers, are used to typify the struggle between good and evil, the evolution of life, the decay of death, and the eternal bliss of Paradise.

Further than this, the handsomest specimens are often designed to commemorate some national event. Some prophets or the edict of a king will be worked out with the utmost care; when the rugs are designed to be the property of a mosque, the knotting of the threads is considered a sacred privilege, and the work is undertaken only by men and women of a most devote and pious mind. Those pieces used in the palaces, about the altars, and in the homes of the rich are frequently interwoven with threads of gold and silver, and are of priceless value.

The Persian loom consists of two rough, upright poles which are nailed to one of the rafters in the roof and secured in holes in the floor. Wedged in between these poles are two others, running parallel with the floor, and on these the web is stretched. The weaver works from a ladder which is placed opposite the face of the loom; this enables him to keep pace with the progress of the work as it approaches the roof. The tools which are used in weaving comprise an ordinary knife, a comb or shanch, as it is designed by the weaver, and a pair of native scissors. This description of Persian weaving and loom equipment practically applies to Turkey and India as well.

In the case of India, the finest weaves were produced prior to the downfall of the Mohammedan dynasty. Since that time, however, the government has given this especial industry its undivided attention, with the result that the more modern Indian weaves are attaining rapidly their old-time value and merit. Private carpet manufacturing enterprises are being launched all the time, and it is only a question of a few years when the government will cease its operations entirely, leaving a thoroughly equalized competition.

Granting it to be true that Persia was the means of introducing the art of weaving into India, and notwithstanding the fact that many Indian carpets are, to a very great extent, copies of Persian designs, there is one quality for which the Indian modern and antique weaves are notable, namely, the superiority and stability of their colorings. The Indian weaver invariably adheres strictly to fast and best vegetable dyes, which fact accounts for the undoubted and universal popularity of his productions.

The pile of Indian carpets is thick, while the grounds are usually dark or cream colored, with small red or blue designs; no given rule may be laid down as to the character or size of their designs, for the Indian weave embraces a greater variety of patterns than all others combined.

Of what use were the gem points, which form so large a proportion of the arrowheads found in Wash., Ore., N. M., Ariz. etc.? The idea has been recently expressed that they were undoubtedly poisoned and perhaps after all, this is as near the truth as anything yet known concerning them.

ENDURING RECORDS.

Ellen B. Wells.

MAM uses the mightiest means at hand for the sake of preserving history. God often takes even weakest matter on the verge of destruction. Man builds monuments, and hopes thereby to gain for himself a lasting name — forgetting that the very act symbolizes decay. God often makes of their destruction a record more enduring, and adds a meaning man never sought.

He who gazes on the vast pyramids sees not in them the fame of a king or great warrior — rather, the might of a despot, and the groans and sweat of slaves. Even the name of him who reared the structure has passed into forgetfulness. Thus it may often be the very achievement by which man has hoped to rescue his name from the devastating tramp of the iron-clad centuries, oblivion first seized with her relentless fingers; while what he scarce bestowed a thought in doing, lives on and on. Man has ever these two things to learn: that those records alone which God writes are enduring, and that "Truth is eternal."

Would you read a chapter in the great book of man? Let us traverse the waters of the Atlantic and visit Switzerland. We will not seek, today, her libraries of learning, nor read the genealogies of her kings; rather, let us visit some of her quiet inland lakes. If we reach beneath their waters, we shall find the history of a people recorded there — all that is left of a race that was in its glory when Rome "sat on her seven hills and ruled the world." We call them the Swiss Lake Dwellers. They were a simple people, uncultivated and rude; their chief occupation seems to have been small agriculture and the chase. They were somewhat skilled in war; yet could not withstand the assaults of more civilized nations. The Swiss Lake Dwellers have not left us their names engraven on pillars of brass; but God wrote for them an enduring record as their dwellings were being consumed by the flames, and all their possessions swallowed up by the waters of the lakes.

Pompeii prayed that her name might be eternal among the cities of the earth. So God, amid her falling palaces, enclosed securely the records of her history, and poured around and over them the molten lava of Vesuvius.

The history of the formation of the earth was long desired, and long searched for in vain. Man had no tradition of this event. His puny mind was not consulted when the foundations of the earth were laid. But, at length, he beheld strange markings in the rocks, and finally discovered that the finger of God had been writing records there. The track of a tiny animal, the ripple of a wavelet, the pattering of rain, had been upon the sands. The sand had consolidated; and now, what a gentle touch might have erased, is enduring as the sandstone itself. Yet had man been there while these records were being written, he would never have granted that they would remain.

Truly, as we believe there is a voice which pervades all history, so rocks and stones have a language. From them, and them alone, can we obtain the history of the world's formation. We may call them silent; but they surely speak. A voice almighty and all-pervading is in their silence, and surely it is God's voice

and none other; for it is only God that, by ruins, would perpetuate history.

It is one of the inscrutable ways of God, that signs of his omnipotence should be given, not alone in worlds tossed in profusion from his hands; but, also, in that enduring records may be traced in shifting sands.

SOME BEAUTIFUL MATERIAL USED IN THE MANUFACTURE OF PREHISTORIC STONE IMPLEMENTS.

Frederic Gardner Hillman.

BEAUTY of form and perfection of workmanship in Archæological specimens often have their value enhanced or detracted from, by the material of which they are made.

We are all familiar with the beautiful "gem" arrow points of the western part of the United States of America which have been so highly prized and sought for, that they are now counterfeited to a large extent. However, man of to-day with all his facilities and superior tools, has not and cannot produce better workmanship that did the aborigine with his crude appliances. I have in my possession minute points, which I know to be genuine, made from the most fragile obsidian, and fashioned in the most slender and delicate forms imaginable. What the practical use of these tiny arrow points really were is a source of much conjecture, which has never been satisfactorily explained to the writer. These points were made of all sorts of beautiful material, too numerous to mention in detail, but which include quartz, striped agate, moss agate, carnelian, onyx, chalcedony jasper, semiopal, hyalite, obsidian and marekanite.

One of the finest arrow points I ever saw is in my collection. It is of clear limpid quartz crystal with base of black rutile. It was found in Lassen County, California. I also have from the same locality a knife ten inches long, made of translucent black obsidian with bands of brilliant red running through it; another, smaller, of moss agate, and some of the most beautiful and delicately-formed obsidian arrow points imaginable.

Among a large number of arrowheads from southern Mississippi and Louisiana, I have noticed many of a peculiar brownish jasper, tipped with brilliant red on point. The frequency and manner of working it out made it obvious that the aborigines had a purpose in so fashioning it. Did the Natchez Indians have any ceremonial reason in doing this, or was it just the result of a popular fancy?

New England arrowheads are usually rather crude and rough, although occasionally some very fair specimens are found, made of the many-colored porphyry, or petro-silex, so abundant in the seashore ledges north of Cape Cod.

The finest collection of spearheads in the world is undoubtedly that of Rev. E. C. Mitchell of St. Paul, Minn., which contains many beautiful specimens.

Mr. G. B. Frazar of West Medford, Mass., has a very finely-shaped knife made of beautiful translucent white quartz. It was found on the shore of Sebago Pond, Maine.

The best spearhead that ever came to my notice came from Peru. It was made of very handsome greenish chalcedony, almost a chrysoprase.

Some of the jasper spearheads found in Illinois and Missouri are very showy.

Mr. Wallace Thatcher of Yarmouthport, Mass., is the owner of a splendid

spearhead of a uniform deep red jasper, found on Keweenaw Point, Mich. He also possesses a gouge, found on the shore of Dennis Pond, Dennis, Mass. It is eight inches long, well proportioned, and smoothly wrought of handsome serpentine.

A unique knife is owned by Mr. James Angus of West Farms, New York; it is large, sub-oval in shape and made from a piece of silicified wood in which the concentric rings are well displayed in different colors, the exact center of the original wood being also the exact center of the knife.

Miss Anna F. Rice of Wollaston, Mass., is the fortunate possessor of a prehistoric bead of good size, made from a harlequin opal, which was found in Mississippi, and which will be the subject of a special article in this journal. Beads of turquoise and other fine material have not infrequently been found in the southwestern portion of the United States and in Mexico and Central America.

Some of the handsomest Archæological specimens ever found have been discovered among the Aztec ruins near Toluca, Mexico. They are of a greenish obsidian with a smooth satin lustre and running into deeper shade and lighter tints. The writer once saw a magnificent sacrificial knife thirteen inches long made of this beautiful material.

Well-made axes of white quartzite are much sought after, though infrequently found.

Several pipes have been found, made of a crystalline chrondroditic limestone, identical with that used in some of the interior work of St. Patrick's cathedral, n New York City. This material is very attractive to the eye of the collector, but as it is easily worked, it has also been found to be attractive to the maker of bogus relics.

Perhaps the most prized material used by ancient man in the manufacture of his implements, is the jade or nephrite, used by natives in many parts of the world, but principally in Alaska and New Zealand. Well formed and perfect axes of this material and of unimpeachable authenticity, bring as high as twenty to thirty pounds in England. A lady in Fairhaven, Mass., has a part of an axe made of jade, procured by a sailor, in Alaska, who being aware of the desirability of the material, but not of its Archæological value, had it cut up into small pieces, and distributed among his friends.

Genuine aboriginal relics of choice material and in perfect condition are constantly becoming harder to obtain, and should consequently be well treasured and taken care of by those who possess them, for as one of our prominent Archæologists used to say, "The man who made this is dead."

THE editors of the Zoological Record have recently drawn up a table that indicates approximately the number of the living species of animals. The following are the figures given: Mammals, 2,500; reptiles and batrachians, 4,400; tunicata, 900; brachiopods, 150; crustaceans, 20,000; myriapods, 3,000; echinoderms, 3,000; coelenterata, 2,000; protozoans, 6,100; birds, 12,500; fishes, 12,000; mollusks, 50,000; bryozoans, 1,800; artchnids, 10,000; insects, 230,000; vermes, 6,150; sponges, 1,500. General total, 366,000 distinct species.

Department of Mineralogy.

C. T. MORGAN, Editor.

WINDSOR, VT.

The Editor will be glad to receive anything of general interest pertaining to Mineralogy.

Correspondents who wish their manuscripts returned, will please enclose postage.

Anonymous communications will not be accepted.

Copy must be received not later than the 10th of the month, to insure insertion in the next months issue.

Write plainly, and address all articles for this department to Box 112, Windsor, Vt.

GREETING.

WITH the initial number of the NATURAL SCIENCE JOUNAL, the Mineral Editor sends greeting to his many friends.

In the coming year, let us labor to make the Science of Mineralogy mean more than it has ever meant before. Not merely to collect a few paltry specimens, nor yet for the mastery of a score or more of principles which govern the science. Such a course renders the science meaningless, and it is owing to such treatment, largely, that it has fallen so low in general estimation.

Rather let us labor to bring it again into popular favor by dissemination and inculcation of those mental and moral principles which hide behind symetry of form and beauty of crystal.

It is with this purpose in view, that the editor takes up this labor of love, for such it is, and he earnestly invites the coöperation of those interested in this wonderful science.

Let the hills and valleys resound with the music of our hammers. Let Earth's hidden treasure rejoice in the sun's refulgent light, while in each sparkling gem revealed to our wondering eyes, may we see and apprehend some more precious truth, which incorporated into the fabric of our being, shall find its grand ideal in a life of service.

THE BEAUTY OF THE ROCKS.

LUCY WELLS MORSE.

IN this world so full of beauty,
Fashioned by the hand of God,
Countless gems have been discounted,
Buried oft beneath the sod.

Wander with me for a moment
In this cabinet of Heaven,
While we note the names and uses
Of the treasures to us given.

Here's the mica, dear to childhood
For its plates, so thin and bright,
And, contrasting, is the marble,
Cold and still and purely white.

Here are agates; traced upon them
By a penceling divine,
Are the quaintly fringèd mosses,
Perfected in every line.

What is this, so small and dainty,
That has caught the sky's own blue?
Sapphire is the name we give it,
And its motto is, "Be true."

Close beside it lies the ruby
That the God of day has kissed;
Basking in its warmth and color
Is the purple amethyst.

Can you ever view the em'rald
Without thinking of the sea?
Wondrous tales of wave and billow,
It e'er whispereth to me.

All around lie beauteous crystals,
And their many tints, I wis
Borrowed were from sun and rainbow,
Giving added loveliness.

For the ring that is a token
Of the giver's love most fond,
Go we to the field's of carbon,
Take the brilliant diamond.

For the crowns on royal foreheads,
Earth her treasure doth unlock;
Each and all these precious jewels,
Are varieties of rock.

Need I speak of other uses?
They are many; but the best
Is, that in each grace and beauty
Is the Father's love confessed.

Beauty in itself is useful,
And to him who feels its power,
'Tis a guide, support, and solace,
Brightening the darkest hour.

Not alone is beauty lavished
On the towering mountain grand;
If you seek it, you will find it
In the ever shifting sand.

Unto those in love with Nature,
She her mysteries unbinds;
In this field, as in all others,
He that seeks is he that finds.

Do you say there is no beauty
In this rock, so gray and rough?
Bring a hammer; strike upon it;
It is hollow, sure enough.

And, within, a fairy grotto
Flashes on the dazzled sight;
All its walls o'erlaid with crystals,
Sparkling as they find the light.

In the Book of Revelations,
Heavens beauties are unrolled;
Strong and firm the walls of jasper,
Built the city is of gold.

And the walls of it are garnished
With most precious diadems;
But the names are each familiar;
Found on earth are all the gems.

Unto "him that overcometh,"
Meed most precious shall be given;
Carved in stone of solid whiteness,
This certificate of Heaven.

E'en the pen of inspiration
Naught more beautiful could find,
To suggest the heavenly glory
To the questioning, finite mind—

Than the rocks that lie about us,
Let us study them each day;
And to him who made them beauteous,
Render grateful thanks, alway.

LESSONS FROM THE CRYSTALS.

Rev. J. Barton Lawrence.

THAT there is some vital tie between mathematical and moral laws is evident to every reflective mind. Honor demands that reason obey the formal rules of addition and subtraction. No errors are tolerated. The merchant must return exactly two cents on the dollar for a bill of ninety-eight cents; and so on.

We are morally responsible for physical equilibrium, and instinctively this demand is heeded. On the roof, a carpenter keeps subconscious guard over himself; and along the icy pavement, right-minded wayfarers have every muscle in readiness to "catch" themselves, with no thought of rebellion at the imperative of this natural law of equilibrium.

"Square deal" is a common phraze for honesty. "Acute," "obtuse," are in every-day use to describe mental quality. Thus, in many ways, are the sciences of mathematics, geometry, mechanics, recognized in relation with mind. And we might as truly call them the sciences of mind as the sciences of things, for they are what we know and think of the ma-

terial world, quite as truly as what is actually true of it.

Form, as essential to being, as in order preceding matter, is the ancient doctrine of Aristotle. With him, it was as the plan of the architect anteceding the work of art.

Upon this basis, he founded a noble argument for the Supreme Being. "The proof of the necessity of assuming such a principle of being is derived by Aristotle from the development in Nature of objects whose form and structure indicate design."

Perhaps there is no more unique and impressive teacher of morality in the natural world than the science of crystallography. The forms in which the various minerals make their appearance, the prevailing form with each separate mineral, as well as its consistency in color, impress a lesson *sui genesis*, both peculiar and profound.

The Standard of Righteousness is one truth taught by the law of crystals. Calc-spar crystals, for example, illustrate this. It is said that in certain localities in Scotland, the crystals of this mineral take on forms which, at first sight are widely divergent. Some resemble two pyramids with bases in contact, and quite slender (called acicular); while others of the same substance are the shape of rhombohedra and prisms. Moreover, like fluorite, pyrite, and bogite, calc-spar is found in upwards of a hundred various shapes, in crystalline condition. And yet, examination of the internal structure of these diverse forms refers them back to a single simple type, or "primitive form." "It must be observed that in crystal bodies, the internal structure — that is, the arrangement of the molecule — is as regular in an outwardly shapeless mass, as in the modeled crystal which presents itself as a perfect whole."

Nature is exact, correct. Man may, or may not, be able to detect it; he may observe or ignore it, but "Right is right, since God is God."

There is no room for reasonable doubt that there is a common standard for moral nature as well as for the material world. Multitudes may not know it, others do not heed it; but it must be that there is a common law of right for all rational beings. Some people, like the crystallographist, have undoubtedly, discovered the simple, Primitive Type.

A friend of mine whom I was visiting not a long time since, while showing a splendid mineralogical cabinet, brought out a little box, a very choice affair and called attention to some bits of most perfectly formed quartz, sapphire and so on. How highly he prized them. I read in his eyes as he looked to mine for the appreciation realy due so fine a collection of tiny gems. Other bigger ones were arranged on his tasty and well-ordered shelves. But these little fellows were all too precious for the common gaze. These were more perfect than those, hence more to be prized.

In the science of which we are now thinking, "The highest perfection in form, and hence of other properties, it is only found in crystals of moderate or small size."

In other phraze, it is not quantity that makes the gem. Magnitude is not the essential of the ideal, even in nature. Quality, form, symetry are characteristics of perfection. Hence, we conclude in reason, that mere bulk of knowledge,

of wisdom, of virtue, can not produce the ideal in the sphere in humanity. Wealth, honor, fame, beauty, are not prime factors in manhood. Many great men, known like Agassiz, and unknown, have no time for riches, fame and the grosser forms of life, so precious are the flying moments of this world's existence, and thus the study of crystals reveals the law of humility.

"He that humbleth himself shall be exalted."

All richest gems of every kind
Are fashioned by a common Mind;
And underneath the age's dust,
The perfect jewel has been thrust,
In beauty, form and symetry
As compact, pure, as it might be.

We pull the towering mountains, grand,
Down to our feet. We wash the sand
For some wee bit of jewel rare,
From out the shapeless mass the fair
And lustrous face and perfect form
Emerge, as sunshine from the storm.

QUARTZ.

FRED. E. LONGLEY.

QUARTZ, or silica is the most abundant of all the minerals, constituting nearly half the crust of the earth, enters largely into the composition of other rocks, and occurs in abundance in the form of sand in nearly all soils.

Quartz is composed of silicon and oxygen, a solid and a gas. Hardness 7; gravity 2 to 6 and 2 to 7.

It can not be cut with a knife, and breaks into irregular fragments.

Quartz is of the oldest rock formation; when, with the cooling of a great heated mass into a crust and with other rock formation, such as feldspar, mica, hornblende, and quartzite, quartz first originated.

The great abundance of quartz is very important in the economy of Nature, being essential to the growth of vegetation, for some kinds of plants cannot live without it, especially grasses and grains, as it is silica which gives stalks, leaves and stems their firmness.

Many of our soils are made by the action of the weather and water, and are carried down the mountain sides from ledges of rocks, partly composed of quartz, as sediment, helping to form the soil. Continually, somewhere, quartz is forming, and there is no mineral which takes on so many forms and colors as quartz, and its varieties are almost endless.

Quartz is divided into three series; viz.; the nitreous, chalcedonic and jaspery varieties.

The nitreous are rock crystal, pure pellucial quartz mainly; amethyst, false topaz, smoky quartz, milky quartz, phraze, rose quartz, and ferruginous quartz.

Chalcedonic are chrysophraze, carnelian, sard, agate, onyx, cat's eye, hornstone and plasma.

Jasper varities are bloodstone, touchstone, floatstone, tabular quartz, and granular quartz. Some of the finest gems are cut and polished from different varieties of quartz, and it is much valued as a gem.

(TO BE CONTINUED.)

THE largest flower in the world grows in Sumatra. It is called the Rafflesia Arnoldi, and some of the specimens are 39 inches in diameter. The central cup will hold six quarts of water.

HORNEBLENDE.

HORNEBLENDE if not the most useful, is certainly not the least interesting, of all minerals, and for diversity of form and color, may well rival quartz or calcite.

Unlike quartz or calcite, it is not found in rock masses, but is frequently met with in the nodular form. It is easily distinguished by its dark, weather-worn appearance, great weight, and extreme hardness. Internally, it will be found to consist of short, needlelike crystals imbedded in a dark grayish mass.

Some time ago, while on a collecting tour, we were shown a very fine specimen of iron ore (?) which the owner said he found on the hillside near the house. After examining the specimen for a moment, we told him it was not iron ore at all. To his look of surprise, which said plainer than words, "What is it, then ?" we quietly informed him that it was horneblende, a practically useless mineral.

Then we proceeded to explain the derivation of the name. It receives its prefix from the fact, that the crystals are tough, like horn, and the suffix comes from *blenden*, to deceive, because it is so often mistaken for iron ore.

It is often found penetrating quartz in long bladed crystals, its dark color contrasting with the solid whiteness of the quartz, and forming very beautiful specimens.

The writer once had in his possession a specimen of quartz and horneblende, in which the horneblende was in the massive state. There were all the curves and waves of an inflowing liquid mass, showing, unmistakably, how it had penetrated the quartz while in the liquid condition.

There are two varieties, the light and the dark. Of the former, the most important is asbestos. It is the only one of the horneblende family which is used in the arts. Its use for protecting steam pipes and boilers is well known. It is also employed to give body to paint, forming the celebrated asbestos paints. Its protective qualities make it quite serviceable as a paint for metal roofing, though it is considered inferior to graphite for this purpose.

Something like 2000 tons are used in the United States annually. The best asbestos comes from Canada, and brings $90 a ton.

The property it possesses of burning without being consumed, was known to the ancients who gave it its name, *asbestus*, unconsumed. Because of this property, it was used to keep alive the fires in the ancient temple, and is now used for lampwicks by the natives of Greenland.

Actinolite is commonly found in bright green crystals, long and slender, penetrating the gangue, often radiated. It is usually an accessory mineral in stealite. Fine specimens are found throughout southeastern Vermont, particularly at Windham and adjacent towns.

Tremolite has the peculiar property of becoming electric when rubbed with a piece of flannel in the dark. It is often found penetrating dolomite and other rocks, like actinolite.

Webster says it receives its name from Tremola, a locality in Switzerland, where it was discovered. Dana, however, says it is not found there.

Another variety is nephrite, closely resembling tremolite. It was supposed

to be valuable as a cure for diseases of the kidneys, hence its name. It is often cut into images and charms.

Of the dark-colored varieties, horneblende is the most important, but does not differ essentially from the rock of the same name. Horneblende Schist is stratified quartz and horneblende. The quartz is usually granular, while the horneblende takes the form of bladed crystals, both finely and coarsely crystalline. Garnet is a common accessory mineral.

Another variety is Cummingtonite, named for Cummington, Mass., where it is found. It is fibrous and of a dark-grayish color.

CALCITE.

CALCITE is next to quartz, the most interesting of all minerals, and though its inferior hardness prevents its use for lapidary work, it is in some respects even more useful and more interesting than quartz.

It crystalizes in the same system, the hexagonal, but is more diversified in form. As many as seven hundred forms are claimed by some writers, yet these are all reducible to the Primitive Type — the Rhombohedron; a wonderful illustration of the simplicity of Nature in the midst of diversity.

It agrees also with quartz in lustre and specific gravity. In fact, the more we compare the two minerals, we are surprised at the remarkable similarity between them, both in regard to properties and uses. In color, every imaginable shade is represented.

If the classification be extended to include all the calcium-bearing minerals, they will be found to present a bewildering variety.

Of the six systems of crystalization, no less than four are represented, and probably a variety of forms that will extend into the thousands. They will be found to vary in hardness from one to four, with a corresponding variation in specific gravity. In composition, lustre, and color, there is an equal variation, as also in regard to use.

Surely here is a wide field for investigation. While the mineral world has gone mad over quartz, let someone come forward as the apostle of calcite.

QUESTIONS.

[We give our readers a few questions to answer this month. This department can be made one of the most interesting and instructive features of the journal. Let us make it so. Send in your questions and answers. Anything of general interest will be welcome. If it provokes discussion or criticism, so much the better, provided it be not of a personal nature.]

What is an xld specimen?

— J. C. H.

Will someone please give a simple, but scientific method for labelling and arranging specimens on the shelves? — R. H.

Not long since, I was examining a group of quartz crystals, when, to my surprise, I found that the long facets of the pyramids all faced the same way. I turned to other groups to see if the law was universal. I found no exception to rule, and further, I found that, where the crystals were horizontal or oblique, the long facets were usually on the upper side of the crystal. This may not be anything new but it was so to me, and I would be very glad if some of the readers of the journal will kindly explain the cause of it.— M. T. C.

THE NEW BEDFORD SHELL COLLECTION.

NEW Bedford, thirty or forty years ago, was one of the best places in the world for making collections of shells, especially marine univalves. The city then led the world in the whaling industry, and ships were sent out from here to the Arctic and Antarctic, Indian and Pacific Oceans. From these trips large quantities of rare and beautiful sea-shells were brought back by the sailors. As a consequence, many persons began to gather them, — some attracted by their beauty merely, some taking it up as a new fad, and some few from the awakening of a real scientific interest in the shells. As was to be expected, the first two classes, after a shorter or longer period of collecting, ceased from taking any active interest. So now I know of but one of the old collections still in a state of progress. Yet what has been done is considerable, and it may be of interest to review some of the larger collections.

There are six of these worthy of note, and it may be remarked that they were for the most part gathered by ship agents or persons otherwise closely connected with the whalers—their acquaintance with the seamen giving them a distinct advantage in the work.

Two of these collections have been removed from the city. One, the Doane collection, was given to the Marion Natural History Society; the other, after twice crossing the continent, found a berth in the east. The Taylor collection was given to the New Bedford High School. With these exceptions the collections remain in the hands of the original owners.

All the collections show a distinct partially for marine univalves, with the exception of the Taylor or High School Collection which has a good showing in all branches. This collection shows also the effect of personal work more than the others, and it is said to contain one hundred and fifty species from this vicinity alone. It was labelled, after Mr. Taylor's death, by John A. Thomson, — for a long time considered one of the best authorities in the city. It contains the best collection of Unios in the city. Here also are the best specimens of Pholas costata and Pholas truncatas found alive by Mr. Thomas A. Green in three feet of mud at the foot of Long wharf, this city. (See Gould's Invertebrata.)

The Doane collection, which was purchased by Mrs. Rose Delano and presented to the Marion Natural History Society was formerly for the most part unlabelled. Last summer, however, I spent the most of my time in arranging, labelling, and cataloging the marine univalves in it. It contains a very fair showing of these, and in many families it is quite complete, particularly in the Strombs. Among others is a very excellent specimen of the Voluta Junonia which Tryon (See American Maine Conchology) calls "the most rare and valuable American marine shell; specimens in good condition sell for fifty to one hundred dollars." There is also a specimen of Cypræa umbilicata in very fine condition, a shell which, when first reported was declared an impossibility. There are several specimens notable for size, a Fusus proboscidsferus and two very large Spondyli. A Perna is made conspicuous by having a large branch of

coral attached and there is a Pinna nearly two feet long. On the whole it makes a very pretty display and it's chief deficiency seems to be in native shells, and a want of enough duplicates.

The Taber collection has an advantage over the others in point of display. It is for the most part unlabelled but is exhibited in a large case with glass doors reaching from floor to ceiling. The shells are divided very accurately into species and arranged in lines according to size or in geometrical figures. This has a very beautiful effect but is not very convenient for handling. The Cypræas are placed by themselves in a separate case and are especially attractive. Some of the duplicates from this collection have been given to the Y. M. C. A., and are very prettily arranged in two cases in the reading-room. They are somewhat crowded however.

The Hall collection is the only one of the six still on the increase. This from the beginning was collected scientifically. It is thoroughly labelled and arranged by families, geneora, and species in the draws of a large case. The upper half of the case is fitted with shelves and glass doors, and here are displayed the larger specimens and many other curios from tropic shores — the best specimen of mushroom coral I have ever seen, a Neptune's Cup, and a Venus' flower-basket (Euplectella speciosa). The various species in the draws are separated in shallow boxes, and the sub-genera in larger box-covers. The collection is particularly strong in duplicates, and consequently in variation of forms shown. It shows the general tendency of particular attention paid to the marine univalves but is not so difficult in other departments as some of the others. It excels the others is being lacking in almost no family of marine univalves with the exception of the Chitons.

To mention some of the specimens which drew my attention, there is a Argonanta or Paper Nantilus what is all pink. I found one of the same kind in the Doane collection of a deep brown color. Among the Murices which appeared to me the most attractive was the Murex tennispina. This has not as much color as many others but is, I think, by far the most delicate. There is a Triton tritonis sixteen inches long by nine wide.

It is remarkably perfect for so large a specimen, and has a beautiful deep red aperture six inches wide. A Fasciolaria gigantea seems the largest shell in the collection, but it is not, lacking half an inch the length of the Triton. Its narrowness increases its apparent length. If space permitted I might speak of many others — a large but light Cassis cornuta, a fine specimen of Strombus laciniatus, and an orange cowry. But no one can conceive the beauties of such shells without seeing them.

In conclusion, let me say I think in no other city in the United States, certainly in none of its size, have so many fine collections arisen, and the thought came to me that if what are left could be combined in one large public collection, and a proper person put in charge, with adequate powers to contract exchanges, New Bedford would soon have a museum rivalling the best in this respect. It can be done. Would that there were enough persons interested so that it should be done. New Bedford would then rise to that prominence in science which it enjoyed when Agassiz kept school at Penikese, and John Thomson and Thomas Green were living. R. E. Briggs.

Department of Conchology.

ROBERT E. BRIGGS, Editor.
NEW BEDFORD, MASS.

Contributions of items regarding the collection and use of shells, and accounts of personal exploration and new finds are earnestly solicited.

It is intended to consider each month some individual, species, genus, family or class of the mollusca, in this connection. Additional notes are earnestly solicited.

THE HISTORY AND USE OF MOLLUSKS.

ROBERT E. BRIGGS.

It is intended to consider each month some individual species, genus, family, or class of the mollusca, in this connection. Additional notes are earnestly solicited.

I.—CEPHALOPODS.

THE Cephalopoda is the largest class of the mollusca. It is seldom well represented in collections, as the individuals of but one genus are enclosed in shells. In former geologic periods the shell bearing cephalopods were much more numerous, both in respect to individuals and to species. Here are found some of the most curious and beautiful fossil forms which have yet been discovered. Here also may be traced the evolution of a family from a nearly straight to a closely involute form. But now this once great sub-class — the Tetrabranchiata — has been almost entirely replaced by the carnivorous Gasteropods, leaving the pearly Nautilus as its sole surviving representative. So we have principally to deal with those not bearing a shell.

Cephalopods are chiefly used as bait for coarse fish, especially cod. In Newfoundland, half the cod caught is by this means. They are generally caught by "jigs," but sometimes great fires are built on the shore at night to attract them. Drawn by this, the school approaches too near the land, and, left by the receding tide, they are gathered in great quantities

Men, as well as fishes, eat them, and in many parts of Polynesia they are regarded as a positive luxury. The ancient Spartans even made a broth of the inky discharge by which the animal blinds a pursuer. The greatest demand for them comes from the shores of the Mediterranean, during Lent. Here they are much eaten by members of the Roman Catholic and Greek Churches, as they are not included in the prohibition of the use of flesh. In Tunis they bring from six to twelve dollars per hundred weight. They are generally pickled or dried, and sent to Greece, where they are sold at from sixty to eighty dollars per cantav of one hundred seventy-six pounds.

Long did scientists wonder what the true origin of ambrigris was. Finally it was ascertained that it was the result of the disordered digestion of the whale. Now ambergris has a strong oder of musk, as have also many of the species of cephalopods which from the chief food of several kinds of whales. Moreover, in ambrigris have been found the mandibles and other indigestible parts of cephalopods. From this it is surmised that we owe one of our richest perfumes to the good offices of these animals.

Perhaps no animal, the sea serpent alone excepted, has been the subject of such weird and monstrous tales as the cuttle-fish and octopus, both members of this class. From time immemorial stories have been told of the malignant influence of a strange sea-monster having many long arms, a soft body, and terrible eyes; a creature whose chief delight seemed to be in the destruction of human life; a being by whose existence sailors used to explain their dread of the open sea, and to whom was ascribed the habit

of grasping a ships masts with its long arms, and pulling it beneath the waves.

Passing over the ancient legends, and the fabulous accounts of the great Norwegian Kraken, we come to more recent and trustworthy records. Some twenty years ago a gigantic cuttle-fish was caught off the coast of Ireland whose head weighed 112 pounds, whose eyes were fifteen inches in diameter, and whose tentacles were thirty feet long. Stories of cephalopods forty, eighty and even ninety feet long have been told by Newfoundlanders; but as these estimates were generally made in periods of excitement little reliance can be placed upon the figures. To show to what an extent credulity may carry one, we have the ancient church legend of the Bishop of Nidros, who, it is said, discovered one of these monsters asleep in the sun, and mistook it for a huge rock. Accordingly he raised an altar upon its surface, and celebrated mass. The good-natured creature waited until the bishop had regained the shore, when it sank beneath the water.

That such tales, gross exaggerations 'tho' they may be, are not wholly without foundation, the events of last year have conclusively proved. Two well authenticated accounts have come to us concerning these monsters, one, of the attack upon a whale by a cuttle-fish, the other, a scientific report of the contents of a whale's stomach. On very fair authority, we have the weight of one such monster placed at 4400 pounds. It is supposed that they inhabit great depths and, under normal conditions, are not to be met with near the surface. Future investigation may show the ancient myths well founded, and the fables to be truths.

Department of Botany.

FERN SPORES.

WILLARD N. CLUTE.

ONE of the first steps in the study of ferns is the identification of the species in one's own locality, and since the form, structure, and arrangement of the spore-bearing bodies play an important part in the classification of ferns, a knowledge of these becomes necessary at once.

The majority of ferns in the Northern States produce their spores in July or even later, but a few kinds may be had as early as May. Go to the nearest woodland in summer, and selecting a handful of fronds at random, examine their under surfaces. Some of the earliest fronds on each plant commonly do not bear spores and are called sterile fronds, but the rest will be found to have the underside plentifully sprinkled with small dots that vary in shape with different species, some being round, some kidney-shaped and others linear or curved. These are the fruit-dots. Among the handful, especially if they have been gathered in rather dry, rocky woods, will doubtless be found the common polypody — a most cosmopolitan member of the family and one that may well serve to illustrate the subject. Its fruit-dots are round and nearly an eighth of an inch across. Under the microscope these dots appear as hemispherical heaps of orange-colored globes — individually smaller than the diameter of a pin, and each borne on a slender stalk. In these tiny globes the spores are produced. At maturity a ring of cells running around the globe is ruptured, allowing the spores to

escape, and these being very small and light easily float away on the air for long distances or until they arrive at a spot suitable for germination. The globes in which the spores are borne are called spore-cases or *sporangia* and the fruit-dots, of which they are part, are called *sori* (singular *sorus*). The sori are usually borne on the back or tip of a veinlet of the frond.

There is very little difference in the construction of the sporangia of various species, but if the sori of most other ferns be examined they will be seen to differ from those of the polypody in one important particular — when young, the sporangia are covered with a special membrane called the *indusium*. This is of various shapes, in some species like a tiny green cup holding the spore-cases, in others round, star-shaped, uniform, curved, linear or heart-shaped. The shape of the indusium and the way in which it is attached to the frond are important points in the classification of ferns.

In some genera of ferns the sporangia are not borne in sori on the backs of the fronds but instead occur in a continuous band along the margin as in the great bracken family, or covered by a reflexed portion of the frond as in the maidenhair. Some others produce their spores on the fronds or parts of fronds that are very different in appearance from the rest of the plant. Of these the sensitive ostrich and cinnamon ferns may be cited as examples.

When a fern-spore finds itself in a moist situation it begins to germinate and soon gives rise to a minute, heart-shaped leaf-like body called the *prothallium*. It is fastened to the soil by slender rootlets and develops on its under surface, organs analogous to the stamens and pistils of higher plants. From the union of these the new fern plant finally comes. As soon as the new plant is well started the prothallium usually shrivels up and dies. In some exotic genera, however, the prothallium is said to live on and become a part of the plant, being renewed each year.

Those who wish to experiment with the young ferns will find the rearing of many kinds from the spores a not very difficult matter. The fresh spores may be sown on a block of peat, the base of which rests in a saucer of water. The peat will absorb the water in the right quantity to suit the sporelings which soon appear. A damp shady place is the best in which to grow them. When the young ferns have put up two or three fronds they may be pricked out into small flower pots filled with a mixture of sand, leaf-mould, peat and ordinary soil. Another good way of growing ferns from spores, is to nearly fill a shallow pan with gravel placing on top of this a layer of sandy loam. After all has been thoroughly soaked with water, the spores may be sown upon the surface.

Contrary to the general opinion it is not necessary to be a skilled botanist to have an acquaintance with the ferns. With any good botany in hand the mere identification of them is a comparatively easy task. One is not perplexed in studying ferns by a multitude of species as he is with flowering plants. In North America east of the Mississippi river there is less than a hundred different species, and one who can find half of this number in his own locality may consider himself very fortunate. Some whole

states do not contain as many. If it were generally known that this beautiful race of plants is so easy of approach, there is little doubt that they would receive much greater attention than they do at present.

Department of Physiology and Hygiene.

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THE PHYSIOLOGICAL AND HYGENIC STATUS OF SUGAR.

Dr. A. L. Benedict.

FEW persons realize the importance of sugar in the human body, the prevalent idea being that it is a luxury of the palate and that its effects are positively harmful. We anticipate, therefore, some surprise at the statement that more than two thirds of all the organic food ingested, becomes glucose before it is of the slightest value to the body, and that this sugar is, so to speak, the fuel whose combustion furnishes the heat and power required to run the machinery of the system. This statement alone shows that the use of sweet foods, of candy or of sugar as such, must be considered as seriously as that of any other food.

It is a matter of simple observation that, however necessary glucose may be in the chemical processes of the body, life can be supported indefinitely without the ingestion of this or any other saccharine substance and the conclusion is obvious that glucose is formed within the system from some other material. There is a very important class of organic chemicals found especially in the vegetable kingdom but also elsewhere in nature, and known as carbohydrates. As the name somewhat vaguely implies, these substances all consist of carbon united with hydrogen and oxygen, the latter two elements being in the same proportion as in water, namely two atoms of hydrogen to every atom of oxygen. The principal members of the carbohydrate group are starch, cellulose and the various sugars. Cellulose composes the dense fibrous portion of vegetable structures and is indigestible, though not harmful unless taken in too great quantity. Starch is the main ingredient of all edible plants, amounting to fifty or seventy-five per cent. of cereals and being practically the only nutritive in potatoes.

In a general way, it may be said that the ultimate aim of all digestive processes, mechanical or chemical, is to render insoluble substances soluble. It is evident that starch, even if boiled into a paste, is not in a proper state to pass through an animal membrane and to circulate through blood-vessels. For some unexplained reason, çane, milk and malt sugars which are already soluble, are also unadapted to the requirements of the body, and are converted into glucose before they become available for oxidation.

The very first digestive act of the body is a step in the process of converting starch into glucose. If, after carefully rinsing the mouth, a piece of boiled or baked potato is thoroughly masticated for a minute or two, a sweet taste gradually develops. This is, in itself, a test of the presence of sugar but ordinary chemical experiments may be used to show that, while neither the saliva nor the potato contained appreciable quantities of sugar, the mixture of the two, does. The sugar formed, however, is not glucose but maltose, a substance having the

same empirical formula as cane sugar but rather resembling glucose in its reactions. The same experiment performed with raw potato, or other forms of uncooked starch, will neither cause a sweet taste to develop nor yield the reactions of sugar. The explanation of these phenomena is that saliva contains a peculiar ferment called ptyalin, which, at or near the temperature of the body, has the power of converting starch into maltose, while it is not sufficiently powerful to penetrate the envelope of cellulose in which the starch granules are contained. Cooking ruptures these little envelopes, the change being, on a microscopic scale, the same as that which occurs visibly when corn is popped.

The secretion of the stomach has no action on starch, though digestion by means of ptyalin, proceeds for some time after food is swallowed. When food passes out of the stomach, from two to seven hours after a meal, it enters the intestine and is subjected to the action of a secretation flowing from the pancreas. This secretion has very complex functions but one of them is essentially the same as that of saliva, the conversion of starch into maltose. The pancreatic ferment, however, is at least forty times as energetic as ptyalin and it digests uncooked starch as well as that whose cellulose has been ruptured by cooking. A banana, for instance, may have the small amount of sugar which it contains, abstracted in the stomach, but the bulk of its substance, consisting of raw starch, remains undigested till the intestine is reached. As the result of starch digestion, the body is supplied with a large amount of malt sugar, it also has a greater or less amount of cane sugar, and especially in the case of infants and invalids, considerable milk sugar introduced with food. These various sugars all have the same proportionate amount of carbon, hydrogen and oxygen in the molecule, and all are modified so as to produce glucose, by the secretion of the intestine itself.

We may readily infer the tremendous importance of glucose in the system, from the fact that two entirely distinct secretions, the saliva and the pancreatic juice take part in the first step of the digestive process and that this preliminary digestion is completed by the secretion of innumerable microscopic glands in the intestine. We may also note that the salivary glands which secrete ptyalin are four in number and are anatomically separate, so that a failure of this secretion is almost unknown.

The practical deductions are obvious. Glucose, provided it be glucose and free from impurities, by no means deserves the odiom in which it is held. Mastication and the mixture of saliva with food are necessary digestive acts. Sugars, including candy, must be regarded not as essentially harmful substances but as more or less perfectly digested foods. While, in general, it is unwise to perform for the body a digestive or other function which it can perform itself, there can be no objection to a moderate use of sugar and candy, especially when the desire represents a normal appetite. The common mistake in regard to the use of candy, is to abstain from it till the natural appetite has become exaggerated into a craving which leads to gluttony. Candy and other sweets should be eaten at the close of a meal, so as not to interfere with the appetite for ordinary plain food.

Then, if candy or sweet fruits are taken as a dessert, in small quantities daily, the temptation to gorge one's self with this form of concentrated digested food will disappear and with it will disappear the dyspepsias and bowel troubles which now apparently justify the notion that candy and sugar are injurious.

The "Grotto of the Nymphs," more generally knowu as the "Blue Grotto," in the Island of Capri, has now, according to George Mariel, the French geologist and explorer, a formidable rival in the "Manavor," or "Dragon's Grotto," in Majorica, one of the Balearic Islands.

A party of western naturalists are soon to explore the Pacific coast of Mexico, as well as Arizona, Sonora and the Pacific Islands. The party will comprise skillful taxidermists and collectors, and their whole time will be devoted strictly to scientific research. We hope, from time to time to give accounts of their explorations.

Professor F. C. Porter, who has held the chair of botany, zoology and geology in Lafayette college for more than 30 years, will retire at the end of the present collegiate year. The Philadelphia Telegraph thus speaks of him: "Dr. Porter's eminence in botany has been widely recognized. He worked over the Hayden collections, made in the Rocky Mountains in 1870–'74, and has been in constant correspondence with leading authorities in this department of science, such as Dr. Gray, Dr. Torrey, Dr. Engleman and Dr. Darlington. His name has been given to a genus of plants belonging to the rose family (Porteranthus), and there are about 80 species with which his name is scientifically associated. Dr. Porter's herbarium became the property of Lafayette when he went to Easton, and it has since been greatly enlarged. He has also made a flora of the state of Pennsylvania which is by far the fullest and best in existence."

A number of ports on the north coast of Africa are developing quite an industry in the quarrying and shipping of mineral product. Prominent among these is Oran, a city of about 75,000 inhabitants which supplies a great variety of minerals including marble, onyx, porphry and slate. Other important places in this line are Algiers, Bona, Philippeville, Trepoli and Tunis.

It is currently reported that our friend, Mr. C. J. R. Carson, of Los Angeles, Calif., dealer in Curios and Antiquities offers $5000 for the head of Gen Weyler, Captain-General of the Spanish Army in Cuba.

An important change in the map of Central America is now in order, President Cleveland having officially received the minister of the new Republic of Central America.

The notable collection of firearms, covering the period from the earliest invention to the civil war, and the invaluable collection of revolutionary and Indian relics, which A. E. Brooks of Hartford, Conn., has been collecting for 25 years, is to be deposited in the Wadsworth Athenæum. There is not an individual collection that can be compared with it.

THE
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We shall endeavor to keep up to the times in all matters pertaining to the Natural Science.

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NOTES.

HENRY B. FUNK of Arkansas City, Kans., has a valuable relic, a pitcher presented by Queen Elizabeth to one of his ancestors, Baron Von Funk. It is five inches high, and is in perfect order. The different colors are as bright, apparently as when first burnt in.

AT a meeting of the Port Huron, Mich., Academy of Sciences, held on Friday evening, Jan. 8th, the following officers were elected:

President — Dr. M. Wilson.

Vice President — Dr. Farrand.

Secretary and Treasurer — J. H. Dykeman.

Chairman of Section of Botany — C. K. Dodge.

Chairman of Section of Archæology — Captain F. I. Merryman.

Chairman of Section of Geology — Dr. Stockwell.

Chairman of Section of Astronomy — Dr. Wilson.

Very few of the educational institutions of the United States have sufficient means to conduct even a small exploration. The writer has known for some time of some yet unexplored Cliff Dwelling in Socorro Co., New Mexico, near the Arizona line; and has communicated the fact to our principal universities, yet all have lacked either the enterprise or cash to do anything in the matter. This is a deplorable state of affairs as there has been far too little intelligent study of the Cliff Dwellings, and far too much ruthless plundering of them by ignorant and unexperienced people.

The students of marine univalves and to a certain extent those of land univalves, have been blessed with a thorough manual on the subject by Messrs. Tryon and Pilsbry. When shall the students of bivalves be similarly blessed? Prof. Pilsby, we're waiting.

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Announcement.

With the next issue we shall commence a new department, that of Ornithology and Oology, to be conducted by Prof. W. A. Stearns of Atlanta, Georgia.

This will greatly enhance the value of the JOURNAL, although the subscription price will remain the same.

Those interested in this department will be highly gratified to learn that we have secured the services of Prof. Stearns as editor, and they may be assured that the department will be conducted in a thoroughly interesting and scientific manner.

We also hope to secure the services of a well-known botanist, with whom we are corresponding, to take charge of that department.

We shall add a number of new features, including a literary review, a question box to which correspondents are now invited to send questions; an exchange and want department for which notices will be free to subscribers, and should be sent in now; and several other new features.

We shall try to make each issue better than the former, and want your hearty coöperation. Send in your subscription now!

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DR. JOHN FRYER of the department of Oriental languages at Berkeley, in California, has come into possession of a volume of the famous encyclopædia published in China in 1776 and containing at that time 5,000 volumes, which were indexed in 20 volumes. The book is known as the "Tu-schuchi-Ch'eng," and is one of the largest literary works ever produced in the world. The subjects treated comprise the entire sum of knowledge possessed in China, classified under the six heads of astronomy, and mathematics, physical and political geography, human relationship, science and inanimate nature, metaphysics and doctrinal philosophy and political economy.

THE walking stick which Queen Victoria has found it necessary to use during the last few years is a staff of oak, originally made for and presented to Charles II. by a citizen of Worcester. When the Queen first used it, it had only a plain gold top, but in after years there was added a queer little Indian idol, which formed part of the booty of Seringapatam.

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Department of Geology.

Prof. G. K. GREENE, Editor.

23 WEST MARKET STREET, NEW ALBANY, IND.

NOTES ON SOME INDIANA FOSSILS

PROF. G. K. GREENE.

ABOUT twenty years ago, my attention was called to what I then supposed to be Clay Stones, by Col. T. G. Morrison, of New Albany, Ind., who had collected them on the side of the Knobs west of the city. At the time Col. Morrison pronounced them coprolites but I was not fully convinced that they were.

Two years later I was requested by the Colonel to call at his house, and inspect some finds he had recently made, and to my surprise I found he had collected several dozen well defined coprolites, and coprolitic concretions containing concularias and two or three species of bones and teeth of fishes.

To Col. Morrison is due the credit of bringing these beds and their contents to the notice of collectors.

I have made frequent visits to different points of the Knobs, and have succeeded in finding many new species of brachipods, gasteropods and cephalopods. Among those published are *Rynchonella greenana* (Ulrich); *Murchisonia indianensis* (S. A. Miller); *Cyclomena pulchellum* (S. A. Miller); *Halopia grandis* (S. A. Miller); and *Ganiatites greenei* (S. A. Miller.) A number of undescribed species are now in my collection.

Five miles west of New Albany at Edwardsville, where there are extensive quarries in the Keokuk and Warsaw limestones, fish teeth in a fine state of preservation can be found, imbedded in the rock. They frequently occur in the clay partings of the Warsaw limestone, associated with the crinoids, blastoids, brachipods and three or four species of zaphrentis.

STROPHOMENA AND THE TYPE OF THE GENUS

BY S. A. MILLER.

PROF. HALL, referring to Strophomena, in Palæontology of New York, Vol. VIII., p. 246, says:

"Probably no generic term among the brachiopoda has given rise to a greater diversity of expression of opinion among authors as to its value and application."

He then proceeds to show that Rafinesque made use of the word, without definition or illustration, in 1820, and so did Defrance, in 1824. That, in 1825, de Blainville used the word, with a short obscure definition, illustrated by a dorsal and ventral view of Strophomena rugosa, Rafinesque. Prof. Hall reproduces these

original figures. In 1857, the figures and a description appeared in the Dictionnaire des Sciences Naturelles, and Prof. Hall says:

"We have here a good description of this American species accompanied by intelligible figures, and although the name has never been current among naturalists, in this country, there seems sufficient reason to believe that it is the same species which was subsequently described as Leptæna planumbona, a common fossil in the upper horizon of the Hudson River Group in the Ohio Valley."

Rafinesque never defined or illustrated the species.

Prof. Meek, in 1873, reviewed this history of Strophomena, in Ohio Palæontology, Vol. 1, p. 73, and says that Prof. Hall saw in Rafinesque's collection, purchased after his death, by Dr. Poulson, a specimen of the common species *rhomboidalis* accompanied by a label, on which was written, in Rafinesque's well-known handwriting, the Strophomena rugosa. Meek thought that rhomboidalis, under the circumstances, should be regarded as the type of Strophomena, but that Blainville did not have such a form before him; on the contrary it was one of those resupinate forms, "Apparently undistinguishable from the common western species, S. planumbona, to which species it almost certainly belongs."

Where is the authority for saying that Blainville had before him S. planumbona? And if he did, and the genus was established, the species was also, and planumbona becomes a synonym for rugosa; it must be suppressed and cannot be made the type of Strophomena, in any event. The name rugosa would stand because it was established if Strophomena was.

I have handled thousands of specimens of Streptorhynchus planumbonum, which are so abundant, at Richmond, Indiana, that a man may collect a thousand or more in a day, and there is nothing in the description of Blainville or in the reproduced figures (I have not Blainville's work before me) that would suggest that species to me. I have laid specimens by the side of the figures and submitted them to artists, and they have been unable to understand how any one would have made such illustrations to represent such forms.

The figures agree, in all respects, except in the greater width of the deltidium or delthyrium, with the form known here as Orthis insculpta. I do not know that the type O. insculpta, from the Trenton Group of New York, is specifically identical with the O. insculpta from the superior part of our Hudson River Group, but they have always been so regarded.

I have laid specimens of Orthis insculpta by the side of the reproduced figures and submitted them to artists, who think they are probably the same.

I am reasonably confident that de Blainville's artist had before him when he drew those illustrations a specimen of our Orthis insculpta, which had a concave pedicle valve. It is sometimes concave, sometimes nearly flat, and often convex. Orthis insculpta has a rugose shell, the plications are the size of those shown in the illustrations and the general form of the shell agrees with the illustrations. Streptorhynchus planumbonum is not rugose, it never has such plications, and it never assumes the general form of the illustrations.

I am not aware that any other one has identified Strophomena rogusa of Blain-

ville with Orthis insculpta, but I am confident the figures reproduced by Hall come nearer representing that fossil than any other one from the Silurian rocks of the Ohio Valley, notwithstanding the difference that may be distinguished, by reason of the larger deltidium or delthyrium.

This identification, if correct, does not destroy the genus Orthis or make Strophomena rugosa the type of that genus; it simply shows the folly of trying to restore old generic and specific names that were never defined or illustrated by the author himself.

The history of the use of the word Strophomena, in America, may be briefly stated, as follows: In the Annual Report of the Geological Survey of New York for 1838, T. A. Conrad, who had in charge the palæontological department, named as new species Leptæna alternata, L. deltoidea and L. semiovalis, the last one of which was regarded later as synonymous with Leptæna sericea. In the table of Organic Remains, in the report for 1839, he called these species Strophomena alternata and Strophomena deltoidea. These names were repeated in the Report for 1841.

On the first of January, 1842, Ebenezer Emmons transmitted to the Governor of New York his Report on the Second District, which was published the same year, in which he illustrated Strophomena alternata, S. deltoidea and S. nasuta. In January, 1842, Conrad read before the Academy of Sciences of Philadelphia his "Observations on the Silurian and Devonian Systems of the United States, with descriptions of new Organic Remains" (Proc. Acad. Nat. Sci., Vol. VIII., p. 228), in which he described and illustrated new species of Strophomena, and among these are Strophomena camerata, S. tenuilineata and S. nasuta from the Trenton limestone, as well as others that have since been referred to other genera and he also referred to Strophomena alternata and S. deltoidea. In 1842, Vanuxem, in his Report on the Third District of New York, illustrated from the Clinton Group Strophomena depressa, which was reproduced in 1843 in Hall's Report on the Fourth District.

The purport of all this would be, if Conrad had coined the word Strophomena, that S. alternata and S. deltoidea would be the types of the genus Strophomena. The fact is, however, that Conrad supposed Rafinesque had founded the genus Strophomena and he was applying it to congeneric forms.

Prof. Hall, in 1847, in Pal. N. Y., Vol. I., used Leptæna instead of Strophomena, for these species, but in the synonyms, at the head of the descriptions, he gave references to the publications of Conrad and Emmons where they had used Strophomena. When, however, the 12th Report of the N. Y. St. Mus. was published, he corrected the nomenclature of Volume I. and used Strophomena, for S. alternata, S. deltoidea and kindred species. From that time down to 1892, all palæontologists of the United States used Strophomena instead of Leptæna of these forms.

The first palæontologist appointed on the Geological Survey of Canada was E. Billings. In the Report of Progress for the year 1858, in the Reports of both Billings and Richardson, Leptæna sericea and Strophomena alternata are mentioned as constituting part of the fauna of the Chazy, Black River and Trenton Groups.

And from that year to this or for forty years these names have been applied to the fossils by all the officers of the Survey, and used exclusively in the palæontological Reports of that country, so far as I am aware, without exception.

In the Canadian Naturalist, Vol. V., for February, 1860, Billings said:

"In the Silurian rocks of Canada and the neighboring countries there are many species or varieties of that group of the genus Strophomena of which S. alternata may be regarded as the typical form. These are all closely related and yet exhibit such differences that only those naturalists who entèrtain wide views upon the subject of the value and significance of specific distinctions, would feel inclined to unite them under one common name. The forms of this group most common in the Lower and Middle Silurian rocks are S. alternata, S. incrassata, S. deltoidea, S. camerata, S. tenuistriata and some others to be described in this paper."

This language was quoted and approved, in June, 1862, in his Palæozoic Fossils, Vol. I., p. 115. And, judging by the general Geology of 1863, and all the later publications, it has been accepted without opposition, in that country, since that time.

It may be stated, that at the very commencement of the study of palæontology, in the United States and Canada, the word Strophomena came into general use as the generic name for Strophomena alternata, even before that common fossil had been described or illustrated, and it has been used as the generic name for that species almost exclusively ever since. It was not long after it had been defined and illustrated until it was regarded as the typical form of Strophomena, as shown by the express language of Billings and its use in the school text books, as appears by Dana's Manual of Geology of 1862, where we find Strophomena alternata, Leptæna sericea and Strophomena (Leptæna) rugosa, showing that Strophomena rugosa might be a Leptæna but not so with S. alternata.

The name Strophomena was first applied, without definition or illustration by one party to a fossil from America which gave to it no vitality as a scientific term. Subsequently another author attempted to define and illustrate the type under the name of Strophomena rugosa but no one can tell with certainty from the definition and illustration what species the second author had before him. Authors generally have said that it was Strophomena depressa, an European fossil, with an older name, and which is said to be a synonym, for Strophomena rhomboidal is a still older name, that Rafinesque had named and Blainville was trying to describe. Others recently have said, they believed it was a fossil belonging to another genus and which has been described since that time as Leptæna planumbona and is generally known as Streptorhynchus planumbonum, that Blainville was trying to describe, and I express the opinion that the illustration is a better representation of Orthis insculpta than it is of either of the other species.

We cannot receive the generic name Strophomena or the specific name rugosa from Rafinesque. We cannot take either one from Blainville, because he did not pretend to be the author of either one, but credited them both to Rafinesque, and his definition is so obscure and his

illustrations so peculiar that no one can tell what species he was crediting to Rafinesque. The next author, who used Strophomena, in such way as to establish it, was Conrad, who was like Blainville, in supposing that Rafinesque was entitled to the credit of the generic name, but he applied it to S. alternata, which species was so thoroughly studied, described and illustrated that it became or was regarded as the typical form at the dawn of palæontological studies and has so remained for nearly forty years. Why then may not Strophomena alternata be regarded as the type of the genus?

Leptæna planumbona cannot be used as the type in any event. The species was unknown and undescribed until 1847 and then it was referred to an old genus. And if it was the species which Blainville illustrated, it would be Strophomena rugosa and not Strophomena planumbona. Hall's specific name would have no place in science but become a burthensome synonym. Blainville did not undertake to name or describe a genus or species of his own, but only to call attention to one of Rafinesque's species, and if he used a specimen of Leptæna planumbona for his description he was mistaken in all respects; for the label written by Rafinesque, which is the only evidence we have as to the species he named, accompanied a specimen of S. rhomboidalis in his own coliection. Beside it is quite improbable that Rafinesque applied the word rugosa to such a shell as planumbona, and I cannot think that Blainville would have done so either.

From these statements it is quite clear that we may eliminate the work of Blainville from the consideration of the subject for it can have no bearing on a rational conclusion.

Before proceeding further, it is necessary to call attention to another fact connected with this history. There is a group of fossils commencing in the Trenton fauna and occurring in nearly every succeeding geological formation to the middle of the Subcarboniferous, that is generally referred to the species named, in 1769, Conchita rhomboidalis. All concede that the fossils in this group are congeneric, but some think there are several species included under one name, and I am one of that number. The difficulty surrounding any subdivision of the group is to find reliable distinguishing specific characters that can be described and illustrated.

Near Richmond and Weisburg, Indiana and Lebanon, Ohio, in the upper part of the Hudson River Group you may find, in the same association, Streptorhynchus planumbonum, Orthis insculpta, Strophomena alternata and a species belonging to the group of Strophomena rhomboidalis that is very rugose and has been locally known as Strophomona rugosa, Rafinesque, for many years. If Rafinesque obtained his type from this locality, as all agree, there cannot be a shadow of doubt that the form known here as Strophomena rugosa is the same that he named and the same that Hall saw in his collection named Strophomena rugosa, in his own handwriting. I believe no one has attempted to define and illustrate Strophomena rugosa from the Hudson River Group except the short notice of the form under the name of Strophomena rhomboidalis, in Ohio Palæontology, by Meek, and the illustration of a form that is not characteristic and the locality from

which it came is not given. Indeed Meek's figures have more points in common with Blainville's than the latter has with S. planumbonum.

We must retain the name Strophomena because it has been defined many times and is interwoven with the science, and it wrongs no one to credit it to Rafinesque because no other one has ever claimed it. It remains then only to determine what is the type or what shall be regarded as the type. It must be Strophomena rugosa, Rafinesque, one of the group generally referred to S. rhomboidalis or it must be S. alternata.

If these two forms are congeneric, it makes very little difference which shall be taken as the type. S. deltoidea in its geniculation and concentric undulations is somewhat midway between the two species, and, in my opinion, no one has pointed out any generic character by which these species can be separated or distinguished, though recently I have seen them arranged in different genera.

Fixity is one of the primary laws of nomenclature and it must be maintained to secure public interest in the Science. If one party understands one thing by a technical name and another understands a different thing or uses a different technical name for it, the names become a burthen to the science and it would be just as well to abolish the binomial system and use a sentence in description, to point out the object intended, as authors did before the days of Linnæus.

If I am correct, the attempt to change the use of Strophomona by taking the name away from the forms it has represented in the text books and scientific publications for the past two or three generations, and applying it to forms having different generic characters which have been recently ascertained, is contrary to history and science in all its aspects. It is an open violation of the fundamental laws of nomenclature and of course can only be an obstruction in the way of beginners who have not the advantage of an educated instructor. As I have said, it makes little difference whether S. rugosa or S. alternata is regarded as the type, so long as both species are classed in the same genus, as has been done by all American authors until within the past three or four years. This modern innovation, it would seem to me, is the result of the examination of the interiors of a few valves (except with those who refer S. rugosa to Leptæna and S. alternata to Strophomena) and the imaginary discovery of distinguishing characters which I regard as of very little importance. The interiors of the valves in Strophomena and also in Streptorhynchus vary in any given species as much as the exteriors do and no specific distinctions can be founded upon them. This is known to all collectors here.

Mr. Albers brought to me a large number of pedicle valves of Streptorhynchus planumbonum, which he had selected, showing all stages of development of a medium septum, from none at all, to a strong ridge dividing the muscular scars and increasing in size in its anterior extension to an abrupt termination near the margin of the shell, and also showing the crural ridges small and widely divided in some cases and in others coarse and forming a complete ring anterior to the muscular scars, beside numerous other variations that entirely destroy any supposed specific importance

to be attached to such differences of structure.

The name Strophomena is permanently attached to S. alternata and cannot be taken away by the fluctuations in the position of S. rugosa.

ON THE OCCURRENCE OF A FOSSIL LAKE IN NEW JERSEY, WITH MARINE BACILLARIA IN IT

Prof. Arthur M. Edwards, M. D.,
Newark, N. J.

THE occurrence of a fossil lake in New Jersey, and a lake with organic fossils in it, seems phenomenal. But it is a fossil lake, only swampy ground now remaining and the fossil organic remains are those of the Diatomacæ of the mincroscopist.

The remains of a lake which occurred in the glacial period was recorded by Prof. G. H. Cooke in the Annual Report of New Jersey for 1880, and he called it Lake Passaic. But it was problematical; the survey had not made enough investigations to prove it was true. Even when Prof. R. D. Salisbury stated that it occurred, in 1893, the statement was doubted, for the data gathered was still uncertain, and organic fossils were not stated to be there.

Lake Passaic is rather long and does not end to the north in any definite place. Hence it seems to be uncertain exactly where it ends. But the lake which I have now to describe, and which I have called Lake Cartaret from the first Governor of New Jersey, is definite, for I can locate it exactly. Besides it is not half as long as Prof. Salisbury's hypothetical lake and is wider in the extreme.

On the other hand it holds fossil shells f Bacillaria in it. And strange to say some of these are marine now and exist all along the coast. Mixed with the marine and occupying the larger part are undoubted fresh water forms.

Up to 1893, the occurrence of certain "species" as they are called, in fresh water, in brackish water or in salt water of the ocean was held to be indicative of a true "species" so called.

Thus Navicula elliptica was found in fresh water, and hence was considered a good "species." Soon afterward it was found to occur in the ocean, and thus it was called on account of the mode of occurrence, Navicula Smithii.

Afterwards it was seen in brackish water and was named differently. This was the case with other so-called "species." And it came to be distinguished by locality, not appearance of form at all. It was enough to find a form in a certain place to rank it therefore as a "species" and give it a name.

The term species was limited to its natural history usage in the end of the 17th century by John Ray. This conception of "specific characters" rested not only on close and constant resemblance in outward form, but also on the likeness of offspring to parent, a considerable measure of variability being however recognized. Amongst subsequent authors this conception of common descent or parentage became more and more prominent, while the progress of successful definition of species made the limits of their variability seem always narrower and of less importance, and in this way the useful conception of the tolerable definiteness of species gradually crystallized into the absolute dogma of their fixity. Thus Linnæus in the Philosophica Botanica gave the aphorism

"we record just as many species as there were forms created at the beginning," which was generally accepted.

Buffon's obstinate rejection of the Linnæn classification was associated with a belief in the modifibility of species, and showed some foresight of the doctrine as elaborated soon afterwards by Lamark. The general acceptance of this dogma, was however, effected by that of Cuvier; its overthrow dates from the publication of Darwin's Origin of Species (1859)."

Thus speaks Prop. Lankester on the subject:

"In fact, species as ordinarily understood, be it man or monad, does not exist. It is only the name given to a thing by naturalists or their followers, the people. The names given to these things by the discoverers we use for a want of a better, and to distinguish them."

Prof. Salisbury, or Prof. Cooke define Lake Passaic to be that portion of the country in Morris County enclosed by the Second Range of mountains on the one side and the granite range of mountains beyond Morristown on the other. On the south it was limited by the turning into a brook form of Second range of mountains just below Liberty Corner. Whilst on the north it was definitely beyond Pompton Plains. Lake Carteret, on the contrary is included by the First Range of mountains, Watchung range on the east. By the granite hills beyond Morristown on the west. On the south it stops at a point which runs across from the mountains where the terminal moraine of the glacier lies at Morristown and Milburn. And on the north it does not extend much beyond Paterson. Although at this region the ending is rather indefinite for reasons it will be readily understood, for it broke through the mountains at that place, or nearly at Little Falls and formed the fall at that town and the Great Falls of the Passaic at Paterson. In fact the remains of the lake are shown in the river which lies there, the Passaic River.

With this brief description of the locality I will proceed to state of the finding of fossil Bacillaria in the clay which is left at the bottom of Lake Carteret.

In the clay, blue and red mottled, and light yellow sometimes, there are seen these shells. At a point known as Hatfield Swamp, on account of the swampy nature of the soil left there, I first gathered them, where a bridge crosses the Passaic known as Swinefield Bridge. But subsequently they were obtained at a point further up the stream, namely at Cooke's Bridge, they were found in the clay also. This is about three feet thick at Hatfield Swamp but may be thicker.

When washed and cleaned it shows the well-known fresh water forms of Bacillaria as Navicula vividis and others but there are two hitherto considered marine forms which are common.

They are the beautiful disc known as Actinouyclus Ralpïï and the saddle-shaped Campylodicus achimedes. These I subsequently got living in the water of the Passaic River at Swinefield Bridge and Paterson.

This shows that they are not marine forms at all, although they are common on the coast living in the salt water.

I wish in conclusion thus to record the finding of marine forms in fresh water and to record also the finding of Lake Carterat.

LESSON FROM A FOSSIL

Lucy Wells Morse.

A SLENDER fern was born one day,
Far off in pasture lone;
And, as it missed companionship,
It uttered, thus, its moan:

"Why am I destined here to stay,
Unguarded and unloved;
While others, of less worth than I,
Are cherished and approved?"

Yet, notwithstanding loneliness,
It used the gifts God gave,
Till it attained a beauteous grace
That any fern might crave.

Years passed, the ferns that decked the grounds
Of palaces, with pride,
Had perished long and been forgot;
Their owners, too, had died.

The little fern in pasture lone
Was caught among the sands.
Embedded now in solid rock,
Perfect in form, it stands —

Upon a shelf of marble pure,
Within the palace walls,
Admired by all the lordly guests
That throng the stately halls.

Then, murmur not, though lowly seem
The place where thou dost move;
The God who made thee, watch doth keep,
With unforgetting love.

And though thou understandeth not
The plan He has for thee
If thou art faithful unto death,
Sure thy reward shall be.

NOTES

Queen Victoria's crown was made in 1838, and contains 2,783 diamonds, 277 pearls, 27 emeralds, 17 sapphires and 5 rubies.

Over 400 diamonds are known to have been recovered from the ruins of ancient Babylon. Many are uncut, but the majority are polished on one or two sides.

Spun glass bonnets are being turned out by the thousand by a Venetian firm. The Infanta Mercedes of Spain has received from Venice a white ball dress of glass, as soft and pliable as silk.

It is believed that some of the camels imported in 1853 to run wild in Arizona are still in existence. Indians occasionally report having seen some, and lately the international boundary commission saw two with their spy-glasses on the Mexican border.

The Pacific Company has been incorporated under the laws of the State of Virginia, United States of America, for the purpose of opening up and developing coal fields in Peru and exporting the product to points along the Pacific coast. The authorized capital of the company is $20,000,000. The company's New York offices are in the American Surety Building at No. 100 Broadway. As yet actual operations have not been commenced. It is stated that the price of coal along the Pacific coast varies from $7 to $20 per ton, and while it is expected that prices will fall, the company believes that they can still make from $2 to $4 per ton. —*Spanish-American Industrial Journal.*

Department of Anthropology.

J. S. SILVIA, Editor.
ACUSHNET, MASS.

The Editor is desirous of keeping in close alliance with all interested in this department. All correspondence concerning Anthropology, especially anything relating to new finds and explorations will be gladly received.

A CONTRIBUTION TO AUSTRALASIAN AND POLYNESIAN ARCHÆOLOGY.

FREDERIC GARDNER HILLMAN.

THE object of this article is to treat, in part, of the stone implements of the natives inhabiting Australia, New Zealand and the groups commonly known as the South Sea Islands, together with the adjacent islands.

Australia was, previous to its settlement by whites, inhabited by a black people quite distinct from the other races of Australasia and Polynesia, the only other places where they were found being Torres' Island and the Wellesley Islands off the coast of Australia. (See uncivilized Races of Men. Rev. J. G. Wood, 1870.) The type is widely divergent in many salient points from the Negro race.

The Papuan race, a tall, finely developed people, having very rough skins and bushy hair, inhabit the islands of New Guinea, the Fiji, Solomon, Admiralty and New Hebrides groups, and the islands of New Britain, San Cristoval, Bouka, Bougainville, Ysabel, Santa Cruz, Niue, and Pitt's Island.

The Polynesian race, which is superior to those already mentioned, and a really fine looking people without any of the repulsive features or characteristics so frequently found in savage races, inhabit the Tonga, Samoan, Marquesas, Society, Hawaiian, American, Marshall, Caroline, Phœnix, Pelew, and Gilbert or Kingsmill archipelagoes; Strong's Island and New Zealand.

The islands of Tasmania and New Caledonia formerly supported another race which is now extinct in Tasmania, the skeleton of the last native being in the government museum at Hobart.

I shall not, however, attempt in this article to go into any description of the ethnographic peculiarities of the races with whom the subject has to deal, but simply speak of the material and shape of their stone implements.

We will commence with the stone axes or tomahawks of the Australians. They are made by grinding and rubbing one side of a stone to an edge, rude notches are then chipped in it, after which a flexible stick is bent over it, and the two ends are seized, wormed and parcelled closely together with sinew, which is put on wet. When thoroughly dry, it is plastered over with a kind of sticky wax called "blackboy," which when dry, imparts considerable rigidity to the implement.

A typical implement is the Australian saw—made from a piece of wood, usually a branch of a gum tree. A groove is made lengthwise in the wood, and chips of obsidian or quartz are inserted in the groove and the whole stick is then covered with the "blackboy" gum, leaving the chips or flakes of obsidian and quartz projecting outwards with the sharp edge uppermost at intervals of about half an inch. The saw is usually 15 to 18 inches in length. Wood says: "For Australian work this simple tool seems to answer its purpose well enough. Of course it is very slow in its operation and no great force can be applied to it, lest the teeth should be broken or twisted out of the cement. The use of this saw entails great waste of material, time and

labor, but as the first two of these articles are not of the least value to the natives, and the third is of the lightest possible kind, the tool works well enough for its purpose. A perfect specimen of this saw is not often seen in this country (England), as the blackboy flakes off, and allows the teeth to drop out of their place. Even in my own specimen, which has been carefully tended, the wax has been chipped off here and there, while instruments that have been knocked about carelessly, scarcely a tooth is left in its place. Owing to the pointed end of the handle, the saw can be used after the fashion of a dagger, and can be employed like the warpoo, for the ascent of trees.

Knives and daggers were made by the natives of Australia in the forms common to prehistoric knives and daggers all over the world. The method of fastening them to a handle, however, was peculiar: the base was inserted into one end of a bunch of vegetable fibres, the whole was then bound firmly together by a lashing of string made of reeds, and firmly cemented with the "blackboy" gum.

Some of the tribes, notably those in Western Australia, have rudely flaked and chipped knives, mostly of quartz, which in addition to the ordinary uses of knives, such as opening shell fish and skinning game, are used, as are also sharp pieces of shells, in the observance of a certain rite of circumcision customary among them.

Suitable stone for working up into implements is rather scarce in Australia, hence its place is taken to a great extent by hard wood, shell and bone. Thus it happens that comparatively only a small proportion of the lance, spear and arrowheads were made of stone.

The spears or pikes were made with several heads, usually three or four in number, making a kind of a rude fork-like weapon. Very few of these had heads of stone, most of them being of hard wood, and the tail-bone of the sting ray. Spears of this kind are of considerable thickness and quite heavy; the lances or light spears are extremely slender and very light in weight, the shaft is also frequently quite crooked, one in my possession being very much so. There are two forms of stone heads in the lances: one is the usual form, found among all savage tribes, and consists of a chipped siliceous stone bound tightly to an end of the shafts; the other form, sharp bits of stone (obsidian was undoubtedly used when obtainable) are cemented with "blackboy" gum, precisely in the manner described in making the saw. The Australians were very skillful in throwing the weapons either from the hand or with *wummeras* or throwing sticks, by the aid of which they can throw spears to a distance approximating a hundred yards with great accuracy. Bows and arrows were not so extensively used as in many primitive races. The arrowheads were made principally of bone and hard wood.

Clear quartz crystals were greatly prized as talismans. In passing, it may also be noted that the natives of Australia were wonderfully proficient in throwing stones, simply from the hand, and without a sling.

(TO BE CONTINUED.)

AN ANCIENT BEAD

Anna F. Rice.

One of the most interesting objects in my collection of relics, is a large Opal bead. It was dug from a Mound in Yazoo County, Mississippi, on September 24th, 1890, is blueish-white in color, and measures two inches in circumference. This bead still retains considerable fire; indeed, when held in a good light, is really brilliant after its long burial of unnumbered years, and as its flashes of color come and go, one can easily imagine it may have adorned the throat of some "fair lady" of high rank in the olden time. I have beads of other materials from the same locality, but none as rare and beautiful as this.

Wollaston, Mass., March 9, '97.

Major Baldwin, agent for the Kiowa and Comanche Indians, with a number of wealthy men from the East, will build a $75,000 industrial school for the Indians at the foot of Mount Scott, on the Wichita Mountains. The Indians will contribute $25,000 additional.

The German government is sending out invitations to an international congress on leprosy, at which Dr. Koch, the eminent bacteriologist, will preside. Sweden, Denmark, Norway and Russia have already intimated their intention of being officially represented. The whole subject of leprosy and its attendant evils will come under consideration of the meeting, the aim of which will be to induce the powers of the world to act collectively, if not in the hope of stamping out the disease, at any rate of keeping it within prescribed limits.

Department of Mineralogy.

C. T. MORGAN, Editor.

Owing to the illness of the Editor all matter for this department should be sent direct to the Atlantic Scientific Bureau, 1036 Acushnet Ave., New Bedford, Mass.

AMBER

(From "The Production of Precious Stones in 1895"; extract from the Seventeenth Annual Report of the U. S. Geological Survey, 1895-'96; by special permission of the author, George F. Kunz.)

From the dawn of history, the world's principal supply of amber has come from the southern shore of the Baltic, and chiefly from the eastern portion, the Samland Peninsula, between the Frische Haff and the Kurische Haff, a low region of barren sands, which has been vividly described as "a strange weird land of blowing sand, shifting sand dunes, and poverty stricken amber hunters."

It was first gathered along the shore, where it was washed up by the sea after storms, and some is still obtained in this manner by men who wade into the water and gather the pieces from among the seaweed, etc., by means of hooks, or sometimes dredge for it in boats. The amber, as is well known, is the fossil resin of a coniferous tree, *Pinites succinifer*, which grew extensively over the now partly-submerged lowland of northern Germany and the Baltic in the earlier Tertiary. These ancient forests are now represented by lignite, among which the resin occurs and from which it is washed out by off-shore outcrops. More recently the same beds have been worked by mining where they underlie the shore, and of late the main supply has been thus obtained from two mines, the Palmnicken and the Anna, at Palmnicken and Krax-

tapelle, respectively. The principal points of trade and export are Königsberg, Memel and Dantzig. The amber production amounted in 1893 to 405,000 pounds, valued at $500,000. There are some indications of a failure in the yield of amber from this region, if not immediate, at least prospective. Her von Muder, the Prussian amber expert, is reported as saying that the supply is nearly exhausted. Much of the material now obtained is of inferior quality. In 1894 only one seventh of the amber brought to that part was fine enough for working into ornaments; the rest had to be melted up for varnish and was worth only 3d. a pound for that purpose. On the other hand, it is stated that the reserve supply of amber is so great that if at any time new mines were to enter as competitors the market could be kept depressed for years to prevent the new fields from entering into competition. Messrs. Stantin and Becker of Königsberg, Prussia, annually handle 132,000 pounds of amber, employing 1,500 people—1,350 men, at 2 marks a day, and 150 girls at 1 mark a day. This firm has for many years employed Professor Klebs to gather interesting amber specimens. As a result, they have a remarkable museum entirely of amber and amber articles, which is of special ethnological interest, since they furnish amber to India, Persia, Egypt, Tripoli, Senegambia, Korea and South America. They also exhibit some Chinese amulets and a tower-ring-shaped piece of amber drilled at one end, a finger piece intended for the Soudan, and many quaint ethnological forms. This, with the remarkable geological collection, showing almost every known occurrence and geological condition of amber, in the Provincial Museum at Dantzig, arranged by Dr. Conwentz, and the private collection of Dr. O. Helm, of the same city, affords the student of this interesting fossil gum facilities of study that have never existed before.

In case of a failure of the Baltic amber supply, the question of its occurrence elsewhere assumes increased interest. Similar material is known to occur at various places and in various geological formations, from the Cretaceous to the Quaternary. Amber is found on the east coast of England, in Sicily, and on the shores of the Adriatic, but nowhere in any large amount. In this country some has been obtained both in the Cretaceous and Tertiary deposits, but thus far only occasionally. It occurs on the Magothy River, in Maryland.

Many fossil and semifossil resinous bodies exist which resemble true amber, but are not equal to it in hardness or in brilliancy. Some of these are important articles of commerce in connection with the manufacture of varnish. Of these, the principal ones are the copal of Africa and the Farther Indies, and the "kauri gum" of New Zealand, both of which are of late geological age, apparently Quarternary, passing into the Recent period, as they are semifossilized resins of trees still living, though frequently not now in the same immediate region.

The kauri gum is the product of a large coniferous tree, *Dammara australis*, of Farther India, and New Zealand, well known as a most valuable timber tree, under the name of kauri pine. Thirty years ago the Maori were the only people employed in procuring this gum, which was found on or near

the surface of the ground, in the Auckland district. Now there are perhaps 4,000 whites and 1,000 Maori engaged in this industry in that province, where alone the gum occurs, and from which it is largely exported to Europe and America for making varnish.

The copal resin, like amber, is rich in included insects, and the Chinese in a very clever manner insert brilliant colored beetles in copal and kauri gum by heating, and sell the product extensively as being natural inclusions under the pretense that the beetle is of the same age as the gum in which they have put it.

THE OPAL

Robert Burnham.

IT is not my purpose to give you a scientific article on the opal in all its varities, nor to tell you why one or two substances containing from 90 per cent. to 95 per cent. of silica, with more or less water and metallic oxides and traces of earthy matter, etc., too numerous to mention, should be iridescent—having a play of colors—and be a precious or fire opal, while the other substance, chemically the same, according to the most delicate tests, should be plain as a piece of glass, with no iridescence, a mere common opal or opal agate. It is easy to suggest a reason for the cause of this " fire " as we call it, and which is as good a name as any, being easy both to remember and to understand; and it is easier to admit such reason than to prove it incorrect.

Dana tells you what someone else says about it, but of himself says as little as possible. I was engaged for some time in the opal trade at Queretaro, Mexico, and saw the stones there in all conditions. I went to the mines and bought them in the rough, and had them cut by native workmen, so while I do not go into scientific details, I can tell something of practical interest.

Queretaro is the center of the opal trade of Mexico, and while nearly all the opals are cut and sold in the city, the mines are from 20 to 40 miles distant.

The whole country is a mass of volcanic rock, and wherever water has removed the scanty soil, hardly more than a few inches deep, there you see exposed the solid lava, hardly cold.

There is no doubt in my mind that the opal and some other precious stones—if not all of them—are of volcanic origin, or result from volcanic action.

In some cases you will find masses of opal stratified and evidently of sedimentary or water formation. The mineral water evaporating left stratas of different colors, among others the opal. This is my idea of the formation of the opal; you have it for what it is worth.

Take the finest gem and a clear, colorless stone found in the same matrix, reduce both to powder and the chemist cannot tell " t'other from which."

There is no accepted theory concerning the " fire " of an opal; no one is sure of its cause. Some say it is caused by small fractures, the sides of which reflect one upon the other. Others assert that it is the effect of enclosed water; some specimens have been said to contain 10 per cent. or more.

The mystery about it only renders the gem more attractive; its beauty is granted. It is the only gem that has never been successfully imitated; the

best attempts are easily detected even by a novice.

While some Mexican mines produce valuable gems, others near by yield stones fine to look upon at first, but which in a few days begin to grow cloudy and crack, and in a month fall into valueless fragments; yet even these if put into water or oil will remain intact indefinitely.

Other stones which do not fracture, change from transparent to opaque whiteness, assuming more beautiful fire in such transition.

Some very misleading statements have been written concerning the mines near Queretaro. It is many years since the Jurado mine has been worked. It caved in one day or night and the owners and miners have been so busy wrestling with their great inactivity, that it remains in that state to this day.

The Esperanza is worked now and again in a manner that would ruin any mine; and what I say of it would apply equally to other mines. I do not think of a single exception. The owners of the mines are wealthy, and do not work them because they do not care to. If you ask them "Why not?" they will tell you, "We do not have to."

Now to explain how the mines are worked.

The owner rents the mine or a certain part of it to two men or more—they always work in pairs—at from $1.00 to $3.00 per week, or more should the mine be in a promising condition. These men get out of it what they can by gouging, and in a short time leave it in the poorest sort of condition. The next set of men must do "dead work," which is work without hope of remuneration, in order to get the mine in shape for working. These in turn leave it in worse shape than the others, if this be possible. So the gouging goes on. The Esperanza produces gems of which many contain "straws" — imperfections resembling straws. The Sierra Grande yields stones that are fine when taken out, but they crack and crumble. For this reason it is not worked.

Of course it is understood that all mining work is done by blasting, and on coming from the mine opals have the appearance of pebbles in pudding stone. The matrix being jasper and the opal the more brittle of the two, many more are lost than saved by breaking them out with hammer and chisel. Broken in pieces varying in size from a tiny fragment to a cobblestone, they are sold to the lapidary.

(TO BE CONTINUED.)

THE Chinese wall is the most extensive fortification in the world. According to the surveys made within the last few years, this wall is 1,728 miles in length, reaching from the gulf of Pecheelee to some distance past Soo-Choo, on the confines of Turkestan. This remarkable structure passes up steep mountains, down into gorges and ravines, crosses rivers, valleys and plains, seemingly regardless of obstacles. It is 25 feet thick at the bottom and 15 feet at the top, and 25 to 30 feet in height, with flanking turrets or towers 35 to 40 feet high, every 200 or 300 yards of its length. Its erection was begun in 211 B. C., and it was designed to protect the northern frontier of China against the savage tribes of Siberia.

Department of Ornithology and Oology.

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It is the Editor's desire to conduct this department to the best interests of those engaged in the active study of the subjects of which it treats.

In order to obtain the most satisfactory results it is necessary to have the coöperation of all interested. To this end, the Editor requests that each one send him anything of interest that comes to their notice, either in the form of notes, articles or questions.

GREETING.

To our Young Ornithologists and Oölogists to whom this Magazine may come, *Greeting!*—We are about to open the columns of a New Magazine to the youth of our country, wherein observations and rare captures may be recorded, and questions freely asked—and answered if possible. A child can ask questions that a sage cannot answer; therefore, Agassiz said once in my hearing, "'Never be afraid to say 'I do not know.'" If any of your questions should remain unanswered, it is presumably for this reason.

As we shall probably confine ourselves largely to the birds of North America, our natural question first is, what list will be used? In answer I will say, those of Mr. Robert Ridgeway of the Smithsonian Institution, and of the A. O. U. The former is a recognized scientific authority both in this country and abroad; the latter is more popular with many, however. But, however much or little we shall use either one of these lists or both of them, we shall study and observe, directly, birds, their ways, doings, habits, peculiarities, places of resort, etc., and try rather to be an honest observer than a theory hunter.

Birds will exist and be a fruitful object of instruction, long after systems, societies, and A. O. U's. shall have perished and their members been forgotten. Simplicity and truth survive much longer than error and exaggeration. To be a good and a true observer, and always to tell the truth—no more, no less—is what all of you should aim to do. If an untruth once gets fastened on one, his best efforts are ever after clouded and called in question for this very reason.

Now we shall ask you to send us all the local observations, local lists, rare captures, and rare finds that you can. When you write have something to say. We can get plenty of the I-thought-I-saw kind; and it is hard enough sometimes to identify rare species *from the actual specimens*, so don't send us the observations of the opera glass, *please*. You cannot scientifically depend upon them. A pleasing, well-written account of a bird or an egg hunt is always of value—particularly if the language is well chosen and the descriptive matter accurate. Don't send hastily gotten up sketches, but think well of what you are saying, and let it be something worth saying.

Now every one of you send in all the good news that you can, and we will try to give it room somewhere. For the present send to W. A. Stearns, 7 1-2 Whitehall Street, Atlanta, Georgia.

Don't send to the Editor of the magazine at New Bedford, as it will all have to be sent to me, and that will require double postage and cause much needless delay.

Atlanta, Ga., March 12th.—The Red Birds or Cardinals are out in full force, making the air ring with their long, full, clear warbles. W. A. S.

DR. CLECKLEY'S LIST OF THE BIRDS OF GEORGIA

Dr. M. T. Cleckley.

This is a supplement to John Abbot's list by Walter Faxon, in the July, '96, number of "The Auk," Vol. XIII., No. 3. I have added ten or more species to his list, and have identified most all of the designated species herein listed.

A. O. U. NUMBERS.		
6	Pied-billed Grebe	Resident
54	Ring-billed Gull	"
58	Laughing Gull	"
63	Gull-billed Tern	"
63	Royal Tern	"
74	Least Tern	"
80	Black Skimmer	"
120	Double-crested Cormorant	"
125	American White Pelican	"
126	Brown Pelican	"
130	Red-breasted Merganser	winter resident
131	Hooded Merganser	" "
132	Mallard	" "
139	Green-winged Teal	" "
142	Shoveller	" "
144	Wood Duck	resident
149	Lesser Scaup Duck	winter resident
150	Ring-necked Duck	" "
151	American Golden-eye	" "
153	Buffle-head	" "
184	White Ibis	resident, rare
185	Scarlet Ibis	" "
190	American Bittern	"
191	Least Bittern	"
196	American Egret	"
197	Snowy Heron	"
199	Louisiana Heron	"
200	Little Blue Heron	"
201	Green Heron	"
202	Black-crowned Night Heron	"
203	Yellow-crowned Night Heron	"
206	Sandhill Crane	" "
208	King Rail	"
211	Clapper Rail	"
214	Sora Rail	"
218	Purple Gallinule	"
219	Florida Gallinule	"
228	American Woodcock	"
230	Wilson's Snipe	winter resident
248	Sanderling	resident
249	Marbled Godwit	"
254	Greater Yellow-legs	"
255	Yellow-legs	"
256	Solitary Sandpiper	transient
286	American Oyster-catcher	resident
289	Bob-white	"
315	Passenger Pigeon	transient, rare
316	Mourning Dove	resident
320	Ground Dove	"
325	Turkey Vulture	resident
326	Black Vulture	"
331	Marsh Hawk	"
333	Cooper's Hawk	"
337	Red-tailed Hawk	"
339	Red-shouldered Hawk	"
343	Broad-winged Hawk	"
352	Bald Eagle	"
357	Pigeon Hawk	"
360	American Sparrow Hawk	"
364	American Osprey	"
368a	Florida Barred Owl	"
373	Screech Owl	"
376	Snowy Owl	transient, rare
387	Yellow-billed Cuckoo	resident
388	Black-billed Cuckoo	"
280	Wilson's Plover	"
390	Belted Kingfisher	"
392	Ivory-billed Woodpeckér	"
393	Hairy Woodpecker	"
393b	Southern Hairy Woodpecker	"
394	Downy Woodpecker	"
395	Red-cockaded Woodpecker	"
402	Yellow-bellied Sapsucker	"
405	Pileated Woodpecker	"
406	Red-headed Woodpecker	"
409	Red-bellied Woodpecker	"
412	Flicker	"
423	Chimney Swift	"
428	Ruby-throated Hummingbird	sum. resdt.
444	Kingbird	resident
452	Crested Flycatcher	"
461	Wood Pewee	"
467	Least Flycatcher	"
474	Horned Lark	winter resident
477	Blue Jay	resident
488	American Crow	"
494	Bobolink	winter resident
495	Cowbird	transient
498	Red-winged Blackbird	resident
501	Meadow Lark	winter resident
506	Orchard Oriole	resident
507	Baltimore Oriole	"
509	Rusty Blackbird	transient
511	Purple Grackle	resident
513	Boat-tailed Grackle	"
517	Purple Finch	transient
522	White-winged Crossbill	"
529	American Goldfinch	"
540	Vesper Sparrow	"
542a	Savannah Sparrow	"
548	Lecont's Sparrow	resident, rare
558	White-throated Sparrow	transient
560	Chipping Sparrow	resident
563	Field Sparrow	"
567	Slate-colored Junco	winter resident
575	Pine-woods Sparrow	resident
581	Song Sparrow	"
585	Fox Sparrow	"
587	Towhee	"
593	Cardinal	"
597	Blue Grosbeak	"
598	Indigo Bunting	"
601	Painted Bunting	"
608	Scarlet Tanager	"

610	Summer Tanager	resident
611	Purple Martin	"
613	Barn Swallow	"
616	Bank Swallow	resident
617	Rough-winged Swallow	"
619	Cedar Waxwing	transient
622	Logger-headed Shrike	resident
622a	White-rumped Shrike	"
624	Red-eyed Vireo	"
627	Warbling Vireo	"
628	Yellow-throated Vireo	"
629	Blue-headed Vireo	resident, rare
631	White-eyed Vireo	resident
636	Black and White Warbler	transient
637	Prothontary Warbler	resident
638	Swainson's Warbler	summer resident
639	Worm-eating Warbler	" "
641	Blue-winged Warbler	resident
648	Parula Warbler	transient
650	Cape May Warbler	"
652	Yellow Warbler	resident
654	Black-throated Blue Warbler	transient
655	Myrtle Warbler	"
657	Magnolia Warbler	winter resident
661	Black Poll Warbler	transient
663	Yellow-throated Blue Warbler	resident
671	Pine Warbler	transient
672	Palm Warbler	"
673	Prairie Warbler	"
674	Oven Bird	"
681	Maryland Yellowthroat	resident
683	Yellow-breasted Chat	"
684	Hooded Warbler	"
687	American Redstart	transient
697	American Pipit	"
703	Mockingbird	resident
704	Catbird	"
416	Chuck-will's-widow	"
417	Whip-poorwill	"
420	Nighthawk	"
705	Brown Thrasher	"
718	Carolina Wren	"
721	House Wren	"
724	Short-billed Marsh Wren	"
725	Long-billed Marsh Wren	"
726	Brown Creeper	"
727	White-breasted Nuthatch	"
728	Red-breasted Nuthatch	"
729	Brown-headed Nuthatch	"
731	Tufted Titmouse	"
736	Carolina Chickadee	"
748	Golden-crowned Kinglet	transient
749	Ruby-crowned Kinglet	"
751	Blue-gray Gnatcatcher	resident
755	Wood Thrush	"
756	Wilson's Thrush	"
759b	Hermit Thrush	transient
761	American Robin	"
766	Bluebird	resident
E. S.	English Sparrow	"

I have not identified the following birds recorded in Abbot's List, viz.: Lecont's Sparrow, Scarlet Ibis, Snowy Owl, White-winged Crowbill, Passenger Pigeon, Ivory-billed Woodpecker, Ruby-crowned Kinglet, and Short-billed Marsh Wren.

The new egg-blowing machine recently invented by Mr. Russell Kennedy, of New Castle, Pa., seems to have many very excellent advantages over the old style of holding the egg upside down in the finger of one hand, and expelling the contents by means of a blowpipe. The instrument much resembles the perfume vaporizers so much in use by ladies, judging from the cuts sent me for examination, and present this excellent feature, that the egg remains almost immovable during the process in a cup at the top of the instrument placed for its reception. A rubber bulb is pressed, creating a vacuum, which draws out the contents of the egg easily and without straining one's own blowing capacity. An embryo attachment is also adjusted to the instrument, and the whole, if as successful as its figure and description would seem to imply, would form a valuable addition to any egg-collector's set of "tools." There are two sizes, No. 1 is $3.00, and No. 2 is $2.50. Patent has been applied for, and they will doubtless soon be on the market.

A very beautiful work of art, a Christ in ivory, now on view in Paris, is to be presented to the czar by the clergy of France. It weighs seventy-five pounds, is composed of a single piece of ivory, is exquisite in design and perfect in workmanship. It is valued at $40,000 and was once the property of Queen Marie Antoinette.

Department of Conchology.

ROBERT E. BRIGGS, Editor.

New Bedford, Mass.

Contributions of items regarding the collection and use of shells, and accounts of personal exploration and new finds are earnestly solicited.

SHELLS OF SOUTHERN WISCONSIN.

Mrs. E. C. Wiswall.

TO those interested in the collecting and study of land and fresh water univalves and bivalves, it may be gratifying to learn a little concerning species found in southern Wisconsin.

For a few years I have given what time I could spare to the collecting and study of these very interesting little creatures.

There is so much to learn in regard to them—their homes and habits, that I feel as though I have not yet mastered the A B C of it.

To those just starting out in the business of collecting I would say that I have learned first from hints from old collectors and later by experience, that the earlier one searches for land species after daylight appears, the greater the number and variety of specimens will be that he will obtain.

This is doubtless due to the fact that by far the greater number do their feeding at night.

I have noticed also, when collecting bivalves, they are always more numerous during the latter part of the day, and especially after the sun is low or entirely out of sight. Is this too, because they prefer darkness to light, and are just getting out for their breakfast? Perhaps they might be found numerous during the early part of the day also, but as the distance to the collecting ground is so great, I have never attempted to call upon them before they went to bed.

Many of the small land species, such as Vallonia pulchella, Hyalinia minuscula, Hyalinia arborea, Patula striatella and Pupa armifera, I have collected on our lawn and in our garden, and this before four o'clock A. M. This early collecting is extremely interesting, but one has to bear in consequence the stigma of being called a "crank," and take his chances of being picked up and located in an insane asylum. Those who go early with fishing-rod and bait will gaze at you in amazement, and indeed it must look strangely to them to see one at that hour on the dew-besprinkled lawn in an attitude not unlike that of a heathen before his idol.

I give herewith a list of the species I have found in the southern part of our state.

Unio. Æsopus, Green
" alatus Say
" donicifornis, Lea
" ellipses, Lea
" gibbosus, Barnes
" ligamentinus, Lam.
" luteolus, Lam
" metaneverus, Raf.
" ventricosus, Bar.
" pustulosus, Lea
" rectus, Lam
" securis, Lea
" cornutus, Barnes
" trigonus, Lea
" tuberculatus, Barnes
" undulatus, Barnes
" plicatus, Lesu.
" elegans, Lea
" solidus, Lea
" parvus, Barnes
" fragosus, Con.

" verrucosus, Barnes
" gracilis, Barnes
" spatulatus, Lea
" pressus, Lea
" ebenus, Lea
Margaritana complanata, Bar.
" marginata, Say
" rugosa, Bar
" deltoidæ, Lea
Anodonta Ferrusaciana, Lea
" Footiana, Lea
" imbecilis, Say
" lacustris, Lea
" opalina, Auth.
" edentula, Say
Anaylus rivularis
Aplexa hypuorum, Linn
Amnicola lamosa, Say
Cionella subcylindrica, Say
Carychium exigunm, Say
Ganeobasis livescens, Say
Hyalinia arborea, Say
Hyalinia fulva, Drap.
Hyalinia minuscula, Binn.
Helicodiscus lineatus, Say
Helix multilineata, Say
Helix profunda
Helix (mesodon) thyroides, Say
Helix hirsuta, Say
Helicina orbiculata, Say
Stenotrema monodon, Rackett
Limnæa humilis, Say
Limnæa reflexa, Say
Limnæa ampla, Say
Limnæa palustris, Say
Limnæa caperata, Say
Limnæa stagnalis, Linn.
Limnæa marginata, Say
Lioplux subcarinata, Say
Melantha integer, Say
Patula striatella, Anth.
Pupa fallax, Say
Pupa armifera, Say
Planorbis trivolvis, Say
Planorbis bicarmatus, Say
Planorbis parvus, Say
Planorbis complamatus, Say
Physa ancillaria, Say
Physa heterostropha, Say
Physa gyrina, Say
Patula alternata, Say
Pamatiopsis lapidaria, Say
Segmentina armigeria,
Samatogyrus depressus,
Sphærium occidentale,
Sphærium sulcatum, Lam
Sphærium Jayanum, Pr.
Succinea avara, Say
Succinea ovalis, Gld.
Vallonio pulshella, Say
Valvata tricarinata, Say
Valvata cincera, Say
Vertigo ovata, Say.

THE HISTORY AND USES OF MOLLUSKS

R. E. Briggs.

It is intended to consider each month some individual, species, genus, family, or class of the mollusca, in this connection. Additional notes are earnestly solicited.

II.—MURICES.*

THE Murex family, with its sub-family Purpura, forms one of the most beautiful and interesting branches of marine univalves for study. The majority of the species are brightly colored, and many are very delicate and showy. Specimens are found in almost all tropic and sub-tropic waters, while a few forms can be obtained in temperate seas. In early geologic ages the carnivorous Prosobranchiates—the class to which the Murices belong—were, for the most part

*For a more extensive consideration of the subject, see Tryon's Manual of Conchology Vol. II., p. 43-5, and the Smithsonian Report for 1863, p. 385-403, where also are given very interesting essays on the kindred dyes of ultramarine and murexine.

replaced by the shell-bearing Cephalopods, like the pearly nautilus. The Murex first appears in the Jurassic age. Its representatives rapidly increase in the following periods, with the maximum reached in recent time.

Some species are eaten on the Mediterranean coasts, by the poorer classes, under the name "bulo," but they are not held in high estimation. Apart from this, they are put to very little use now-a-days. Such, however, was by no means the case in ancient times. From a species of the Mediterranean—supposedly the Murex trunculur—was obtained the dye for making the far-famed Tyrian purple. It is of this ancient use we are chiefly to speak.

The vein from which the liquid was obtained is found at the back of the neck. It is branching, and is connected with the mucous gland. It is found in many species, among them, the common Purpura lapillus of our own shores. Remains near Tyre, and a great mass of shells of the Murex brandans called Mount Testaceo near Tarento, Italy, testify to the extent to which the industry was carried in ancient times. What use the animal makes of the liquid is not known, although it has been suggested that it serves the same purpose as the ink of the cuttle fish, to blind pursuers.

The great peculiarity of the liquid is that in the animal it is a murky white and slightly glutinous, but on being exposed to the air it rapidly passes through shades of light and dark green, and blue to a rich deep purple. The cause of this change has not been discovered. Some suppose it to be due to an absorption of oxygen, others to the exposure to light. This latter view is supported by the fact that if material just dyed be placed immediately in a dark room it will retain for years the first assumed pale yellowish-green hue. The ancient dye was famed as much for the permanence of its color as for its beauty, and we read of purple-dyed garments found by Alexander the Great among the treasures of Darius, which though two hundred years old, had lost nothing of their original brightness. On the contrary, the dye obtained from some species at the present time is very evanescent. A strong, disagreeable, fetid odor is given forth when the liquid is exposed to air, and so extensive were the dye-works about Tyre at one time, that the air in the city was tainted by the smell.

The discovery of the value of shellfish for dyeing, dates back to 1500 B. C. There is a legend that Hercules was walking on the shore one day with his love, when her dog bit into a sea-snail. Almost immediately his jaws were dyed such a beautiful shade of red that the nymph was attracted thereby, and expressed an ardent desire to have a robe similarly colored. Hercules of course satisfied her wish, and thus was started a fashion which for many centuries knew no rival, which enriched the cities of Tyre and Sidon beyond compare, and may have been the foundation of their commercial activity. All the shores of the Mediterranean supplied the proper species, but, though numerous, a small quantity only could be obtained from each. The smaller shells were pounded, but if the animal supplied only so much as one ounce of the precious liquid, the vein containing it was carefully removed, and the contents mixed with five or six times its weight of water. The mixture

was allowed to stand until it reached the required shade when the texture to be dyed was dipped. In the time of Augustus, wool thus colored was worth $200 per pound.

As Rome grew in wealth this dye grew in popularity, and it was fast becoming the only dress of the rich, when the edicts of the Emperors abolished its use by private citizens. This was a death blow to the industry—the Byzantine emperors going so far as to prohibit the use of purple ink. Gradually then the art began to be practiced less and less, until it finally became lost. In the middle ages—justly termed dark—the very existence of such a dye was considered fabulous. But with the discovery of America and closer trade relations with the east, came reports of brilliant fabrics colored from the juices of sea-snails. The accounts of Pliny and Aristotle were brought to light by learned men, and impulse was given to scientific investigation. Numerous species yielding the purple dye were found, and for some time there was chance of its regaining its lost prestige, but the bringing of new dye-stuffs from America, the discovery of the value of cochineal in 1650, and the scientific advance in chemistry soon supplied it with dangerous rivals and made it but one among many beautiful dyes. Still, however, it is the color of royalty, and probably will always continue so to be.

A bronze figure just discovered in the Amsterdam Museum is believed by the director to be by Michael Angelo. It represents King David dancing naked before the ark.

Department of Microscopy.

Prof. ARTHUR M. EDWARDS, M. D., Editor.
11 WASHINGTON ST., NEWARK, NEW JERSEY.

GLYCERINE-GELATIN

Prof. ARTHUR M. EDWARDS, M. D.

SOME objects may be mounted tolerably permanently in other substances than varnishes, as Canada balsam, gumthus and the like, and show their peculiarities very nicely. Glycerine-gelatin is a substance easy to manipulate — easier than ordinary Canada balsam, although I believe that gumthus can be as easily manipulated. At any rate glycerine-gelatin is an easy substance to use, and where glycerine can be used with advantage and like some substances it is readily employed. Carbonate and phosphate of lime cannot be used with glycerine for they are both soluble in that substance. But when combined with gelatin it does not seem to dissolve them. However, these substances better not be mounted at all. But vegetable organisms can be so mounted and show very well.

There is a preparation of glycerine-gelatin which I have at times employed, in which the gelatin and glycerine are preserved and made to keep without moulding, which has never been published.

Glycerine of course is the substance which is used, and this is used because it does not mould or develop bacteria. It is harmful to use it however, for it takes the moisture from the air and so becomes dilute, and bacteria can then develop in it. This can be obviated by rendering it non-drying by the addition of gelatin, which itself does not take water from the air.

It also secures the presence of water into it which ordinarily does not dry up. But it has a property which is detrimental to the common use of it as a preservative, and that is it renders substances too transparent for ordinary use, a substance which in the air is rendered obvious by the difference of what is known as the refractive index of that substance. That is to say a transparent substance like glass is rendered visible when viewed in air by the difference of the refractive index of glass and air. It is not so transparent. When immersed is more transparent, and so on. So that substances can be viewed in different media according to the refractive index.

Some substances like Bacillaria shells or diatoms formed of colored silica or onyx cannot be mounted in glycerine-gelatin at all. For they look so transparent that their shells cannot be seen. When living Bacillaria are mounted in that substance the endochrome and oil globules as they are called—they are female organs however—show pretty well, also exhibit their structure nicely. Calcareous shells, as the Foramenifera show very nicely.

Some years ago I experimented with this substance, glycerine-gelatin, and proved that this preparation works very well. Gelatin, I use Cooper's fine gelatin, is broken up and covered with cold water. It is left to stand over night. Next morning the water is poured off and the whole warmed in a water bottle. This is an outer vessel in which water is heated or made to boil, and the inner vessel which contains the gelatin is thus heated without exposing it to the open fire or sounds of heat. The gelatin is thus melted and to it is poured a sufficient quantity of strong glycerine. The quantity used varies according to the specimens used to mount. One part of glycerine to four of gelatin or one part to five, or even one part of glycerine to six or eight of gelatin. To render it so that bacteria can not by any possibility form in it, I use a small quantity, a pinch will do, of pure salycilic acid, such as can be made from Oil of *Satheria procumbens*. I do not use ordinary salycilic acid, because although it is said to be salycilic acid, I think it is not so, at least it does not act the same on the animal system. With this glycerine-gelatin rendered safe with salycilic acid, I have found that it acts nicely, and have merely to recommend it for trial.

It is reported that a new semi-precious stone has been discovered in Mexico. The lucky finder was an opal hunter who accidently came across the peculiar stone. The remarkable formation attracted his attention and he forwarded a sample to Mr. Edward J. Smith, a diamond expert of Chicago. Mr. Smith gave the samples of the stone a careful examination and declares that they are unknown to the trade. He christened them "Clyclops." These stones vary in size from that of a pea to that of a pecan nut. The stones are susceptible of a high polish and in the center is a remarkable resemblance to an eye. Mr. Smith stated that this new gem is fitted to be set in any kind of jewelry. Great secrecy is being maintained as to the locality in Mexico where the gem is to be found, until Mr. Smith and associates are successful in getting control of the deposit or mine.—*Spanish-American Industrial Journal.*

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NOTICE OF WITHDRAWAL.

As we have had no response to our Free Scholarship offer, we feel that the offer is not appreciated, and hereby withdraw it. We still offer very liberal terms to those wishing to act as our agents. Write for terms.

LAST month we announced that we should this month open a new department, that of Ornithology and Oology. We have kept our word and have done still better, and present this month for your approbation, a new department, that of Microscopy, under the editorship of Prof. Arthur M. Edwards, M. D.; of Newark, N. J. Prof. Edwards is well known in the scientific world, and all may be assured that the department of Microscopy will be conducted in a thoroughly interesting and scientific manner.

We have the subscription list and unfinished business of the Interchange, and shall carry out its unfulfilled contracts for advertising, etc.

The lateness of this issue is due largely to "La Grippe." We shall endeavor to be on hand promptly hereafter.

WE have received many congratulatory notes concerning our first issue.

The well-known collector, Mr. James Angus, writes: "I should judge from the imposing array of your editorial staff and from this first number of your magazine, that you had come to stay."

Mr. G. O. Greene of Princeton, Ill., says: "I think your paper fills a gap that papers in the past have over-looked, viz: Geology, Archæology, Mineralogy, Botany, Ornithology and Oology, etc.; these all combined under one cover, edited by able students, will form a valuable journal of study which the student will not be slow to appreciate."

A REMARKABLE discovery is narrated by Professor Carter to the Academy of Sciences of Philadelphia as being made lately near Three Tans, Montgomery county, Pa. In a sandstone quarry at that place an iron tree has been found embedded in the rock seven feet below the surface. The tree is about 18 feet long and about 18 inches in diameter, and has been completely turned to iron, or rather to the iron ore known as brown hematite; and Professor Carter accounts for the phenomena by the fact that the shales and the sandstones in the neighborhood are covered with red oxide of iron, and sometimes with brown hematite. It is presumed that the iron ore was reduced by organic matter, and that it was made soluble in water containing carbonic acid gas; then, as the water holding the iron in

solution came in contact with the tree, the iron was precipitated on the latter, and there was an interchange of vegetable and mineral matter, so that the rocks were relieved of their coloring and the tree took it up.

A few years ago the proposal was made that the chief students of the Unionidæ join in making a revision of the synonomy of that somewhat confusing family. It was a good idea, but we haven't heard of its being carried out. We would suggest that it is not too late to begin.

ON THE ARTIFICIAL PRODUCTION OF DIAMONDS.

MOISSON, by carbonetting iron, fusing it in the electric furnace and allowing it to fall in mercury 10mw. deep covered with a layer of water 20 cum. thick, has obtained granules of irregular shapes and also spheres or ellipsoids, both saturated with carbon. While the former contained no carbon of high specific gravity, the latter contained both black and transparent diamonds, some of which, though microscopic, showed remarkably regular crystalline forms. Subsequently larger masses of the carbonetted and fused iron were allowed to fall into water and mercury at the bottom of a pit shaft 33 meters deep. But these conditions were not favorable to the production of spherical masses of iron. When the falling globules reached the tub containing the mercury, they broke up into scintilating globules, giving a report like a rifle. When the fused carbonetted iron was run into a small cylindrical cavity into a large mass of iron or copper, the fused metal was very rapidly cooled and diamonds were obtained mixed with graphite, the yield however, being small. Moisson has observed that the so-called black diamond, included in transparent diamonds from Brazil, is a variety of carbon differing from the diamond. When such diamonds are pulverized and heated in oxygen at 200° below the ignition point of the diamond, the black matter burns away leaving the residue diamond white.

The gold mine which has been discovered on General Longstreet's property near Gainesville, Ga., yields from $7 to $12 per ton of the precious metal. The vein varies from eight inches in width to two feet and a half.

Papa (reading)—The naturalist, who had slipped from the edge of the precipice, gathered momentum as he fell.

Mama—Mercy! Kept right on picking flowers, even when he knew he was going to be killed.—Odds and Ends.

EXCHANGE DEPARTMENT.

Notices free to subscribers, but must relate to exchanges only. Sale notices subject to advertising rates.

I have 37 fine single bird eggs of Indiana birds in nice case, some scarce; will exchange them for good, perfect Indian relics; good Indian relics to exchange for old flint lock guns or pistols. Send stamp for answer.
C. E. TRIBBETT, Thorntown, Indiana.

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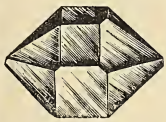

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4.	Apatite crystal, brown, good termination, Burgess, Ontario, 7½ in. long, 2½ in. dia.	.75
5.	Perfect doubly terminated Apatite crystal, Ontario, 2¼ in. long.	.20
6.	Apatite crystal, same locality, without termination. Red, good color, 3½ in. long.	.10
7.	Atacamite, Italy, 2x2 in.	.25
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12.	Beryl, Middletown, Conn.	1.00
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24.	Cerargyrite, Eureka, Nev., 1½x2 in.	.25
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34.	5 lbs. Cyanite, Conn., fine Lake Superior, 1 piece.	1.00
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37.	Epidote crystals, Willimantic, Conn.	.25
38.	Epidote, finely terminated crystal, Warren, N. H.	.2

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64.	Isometric Iron Pyrites Cornwall, England, 2x3 in., very fine	.50
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74.	Ruin Marble, 1 side polished, thin section, corner broken but mended, 3¾x4½ in., Tuscany.	.25
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140. Tellurium, Colo. .25
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152. Vesuvianite, Raymond, Me., very fine, 3 lbs. .50
153. Washingtonite, Newton, Conn. .25
154. Wernerite, perfect crystals, Pierpont, N. Y., 2x2 in. .25
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157. Wulfenite, Bleiburg, Cerinthia, 3z4 in. 1.00
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173.	Rhomb Spar, Wis.; Quartz, Ark.; Barite, Eng.; Biotite, Mass; Rhomb Spar, R. I.; Gold, Cali.; Calcite, Wis.; Gold bearing Pyrite, B. C.; Silver Ore and Galenite, Mass.	.50
174.	Cockscomb Quartz, R. I.; Quartz, Ark.; Quartz, N. C.; Quartz, Mass.; Rhomb Spar, Wis; Galenite, Colo.; Garnet, Mass.; Gypsum, Mich.. and Limonite, R. I.	.35
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176.	1 Doz. Small Quartz crystals in envelope.	.25
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179.	Rhomb Spar, Wis.; Gypsum, Mich.; Spodumene, Mass.; Smoky Quartz, R. I.; Epidote, Conn.; Corundum, N. C.; Galenite, R. I.; Obsidian, Mex; Quartz and R. I. Chalcedonized Wood, S. D.	.40
180.	Nailhead Calcite, Wis.; Spodumene, Mass; Gypsum, Mich; Rhomb Spar, Wis.; Clay Stone, Conn.; Jasper, Pa.; Smoky Quartz, Colo.; Corundum, N. C.; Bloodstone and Garnet, Mass.	.40
281.	Selenite, Mich.; Gypsum, Wisconsin; Quartz, R. I.; Chalcedony, Fla.; Dog Tooth Spar, Jasper, Pa.; Garnet, Mass.; Flint, Eng.; and Petrified Wood, S. D.	.40
	A fine lot of stone relics from Perry Co., Ohio.	
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